UNITED STATES NUCLEAR REGULATORY COMMISSION

Incident Response Function Self-Assessment Report

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 DRAFT

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INTRODUCTION

The U.S. Nuclear Regulatory Commission's (NRC's) 1995 National Performance Review identified the Incident Response Program as one of several programs that were potential candidates for efficiency improvement (see SECY-95-154). More recently, the NRC's Strategic Assessment and Rebaselining initiative raised issues as to (1) what measures the NRC should take to maintain a sufficient planning and response capability for the nuclear industry, State and local authorities, and the Federal Government in view of growing economic pressure and improving safety performance and (2) whether the NRC's incident response capability for nuclear material and fuel cycle facility emergencies was consistent with the risk that was associated with the activities. These issues, coupled with increasing pressure to reduce resources across all program areas, led the Commission to request that a broad self-assessment (SA) of the NRC's incident response function be conducted. The SA included all significant response functions and response readiness activities. The overall goal and primary focus of the SA were to identify initiatives to improve the efficiency and effectiveness of these functions and activities. The SA was conducted by a team of NRC staff from the Incident Response Program office (i.e., the Office for Analysis and Evaluation of Operational Data [AEOD]), the Offices of Nuclear Reactor Regulation (NRR), Nuclear Material Safety and Safeguards (NMSS), State Programs (OSP), and Region III. A representative from an Agreement State also supported the SA. To the extent practical, the SA team utilized the methodology for program assessments developed by Arthur Andersen Consulting, under contract to the NRC.

FINDINGS AND RECOMMENDED INITIATIVES

Goals and Objectives

The SA team found that not all offices and staff have a clear understanding of "incident response." Consequently, the NRC staff occasionally believed that their time and effort was devoted to incident response even though it was actually involved in incident followup activities, such as incident investigation or licensee responder performance evaluation. The SA team recommended that a definition of "incident response" be established, documented, and effectively communicated so that the staff would recognize and understand the difference between response and followup activities.

Incident Response Budget

None of the regions and only three HQ offices (i.e., AEOD, NMSS and OSP) are explicitly budgeted for the full resources needed for incident response readiness and response activities. The NRC's budget for responder training and exercises does not cover the significant full-time equivalent positions (FTEs) utilized by responders attending response training or participating in exercises. The resources expended in support of reactor readiness and response activities are about 50 percent more than those budgeted for these activities by the Incident Response Program office. Some regional administrators indicated that resources budgeted for other programs are used to support required reactor response training and exercise activities, thereby challenging their ability to fully support these activities. The SA team recommended that the regional offices and those HQ offices that provide significant professional, technical, or administrative resources for incident response activities for reactors (i.e., incident response training, exercises, response to actual incidents) should have resources (FTEs) explicitly allocated, at the appropriate levels, to support these activities.

INCIDENT RESPONSE FUNCTIONS

The SA team conducted a broad-based review of response functions and activities for power reactor, fuel cycle facility (FCF, including gaseous diffusion plants) and nuclear material incidents. The SA team's findings and recommended initiatives in the area of response functions and activities are documented in Section 4.0 of the SA report and are summarized below.

Event Notification and Reporting

Experience with reported FCF events indicates that many reported events have low risk or low safety significance. The elevated number of FCF event reports imposes a workload on licensees' response personnel involving making reports and adds to the workload of the HQ operations officers (HOOs) and NRC response decision-makers. In addition, several recent FCF emergency notifications raised questions regarding emergency classification criteria. Similarly, a brief preliminary review of nuclear material event notifications showed that many of the events were low in both risk and safety significance. The SA team also found that notification and reporting requirements for material events may not be commensurate with the associated risks. The team recommended that event notification requests for licensees of gaseous diffusion plants, material licensees, and certificate holders, and reporting and emergency classification requirements be revised so that they are, to the extent possible, consistent with the risk and safety significance. It is recommended that gaseous diffusion plant events of low safety significance should be submitted as 30-day written reports.

Response Decision-Making

The current process for deciding the NRC's response level (i.e., response decision-making process) is complex and time-consuming. The process was found to have expanded over time in an effort to resolve problems involving insufficient expertise, training, and final decision-making authority of the emergency officer and the regional duty officer. A streamlined response decision-making concept and process was identified by the SA team. The streamlined approach would combine the safeguards analysis, the safety analysis, and the decision-making steps. A single decision-maker at HQ and in the region would be involved. Additionally, the team noted that a revision of the NMSS emergency officer procedure is currently being prepared to provide guidance on the appropriate level of NRC's response on the basis of potential risks of event conditions. With clear criteria and adequate implementation of the revised procedure, it would be easier for the decision-makers to make NRC response decisions and thereby reduce the number of staff members participating in the conference call. The team recommended that the response decision-making and activation processes be streamlined and that risk-informed criteria be made available in the evolving NMSS emergency officer procedure revision, to guide the response decision-making for FCF and materials events.

There is a lack of clarity regarding the expected response role of NRC staff for nuclear material incidents which occur in Agreement States. Under the agreement, the Agreement State regulatory agency has regulatory responsibility for monitoring licensee response activities and for carrying out appropriate State response actions. However, under the Federal Radiological Emergency Response Plan (FRERP), as the lead Federal agency, and under its Agreement State oversight authority under the Atomic Energy Act, the NRC staff has questioned whether NRC may have, and should exercise, if necessary, a more substantive response role than only monitoring State response actions and offering assistance. The team recommended that the expected response role of the NRC staff for materials incidents that occur in an Agreement State be clearly defined and formally documented in connection with final decisions on the material response initiatives.

Concept of Operations

The staffing associated with the current practices for power reactor, FCF, and nuclear material incident response involves the expenditure of significant HQ and regional resources to maintain a high level of response. Relatively large site, regional, and HQ response teams (HQ and regional staffing for monitoring material incidents) are utilized. Team sizes have grown over time in response to the lessons learned from exercises and events. NRC-wide, more than 600 individuals are on responder call lists to ensure sufficient response capability and reliability. The aggregate resources spent on response readiness activities reduce the time the staff can spend on other important programs. Feedback from the nuclear industry also indicates that the requests for information made by NRC responders during reactor exercises have distracted the focus and resources of the licensees' responders away from accident analysis and mitigation activities. An analysis of the minimum staffing levels needed to perform critical response activities for the current concept of operations indicates that the number of HQ and regional responders could be significantly reduced while maintaining response performance. Fewer responders would significantly reduce the annual training and exercise costs compared to the current staffing practices. In the near term, the SA team recommended that a trial program be implemented for power reactor facilities and FCFs to assess the acceptability of minimum response teams within the current concept of operations, while for materials incidents the team recommended minimum HQ and regional responder staffing be used for monitoring significant materials incidents. On the basis of the results of the trial program, a minimum responder team or staffing approach would be permanently implemented for all programs areas, as appropriate.

Alternative incident response approaches (i.e., concepts of operations) that would maintain or improve response performance with fewer staff resources were also evaluated. The response options for reactor facility, FCF and materials incidents considered tradeoffs of regional versus HQ in the lead during standby and initial activation and alternative approaches to staffing the initial site team. For each option, the associated costs and advantages and disadvantages in response quality, timeliness, and reliability were assessed. The SA team determined that the NRC responder rosters, response training costs, and exercise costs could be significantly reduced if an “intra-NRC” initial site team, composed of a regional responder core and supplemented by HQ and other regional staff responders, was implemented. The team’s assessment of the intra-NRC initial site team approach indicated generally effective response performance in most respects. Onsite arrival times for reactor incident response and selected performance and reliability issues for both reactor and FCF incident response were identified as requiring further evaluation. For reactor response, the team recommended that if the projected onsite arrival times were acceptable, a longer term evaluation be implemented to fully assess the quality of performance, the reliability, and the timeliness of the less costly alternative response concepts such as an intra-NRC initial site team. On the basis of the results of the followup evaluation, the alternative response concept and minimum team approach should be implemented permanently, as appropriate. For FCF response, the team recommended that the initial site team concept and composition be reevaluated and that guidance for dispatching an initial site team, including its function and composition, be developed. For FCF response, the team also recommended that an in-depth evaluation and trial program of alternative initial site team options, especially the intra-NRC initial site team, be conducted.

NRC executive team members were found to have similar technical and safety assessment backgrounds, and therefore, their advice and counsel for the executive team director tend toward technical assessment issues rather than public communications, State support, or Federal coordination issues. Individual executive team members are not assigned lead responsibility for monitoring NRC’s performance or for making recommendations in specific lead Federal agency responsibility areas. Special expertise, such as in public or congressional affairs, to assess NRC performance as a Federal spokesperson is not represented within the composition of the executive team. These factors were viewed as contributing to the potential for uneven emphasis and attention by the executive team in overseeing NRC’s effectiveness in all of its lead Federal agency responsibility areas. The team recommended that the NRC consider organizing the executive team in line with each of the lead Federal agency responsibility areas and composing the executive team so as to include NRC senior managers with technical assessment, Congressional, Federal coordination, public information, and State expertise.

<u>Other Response Initiatives</u>

A significant fraction of the resources that are expended by the regional offices in response to actual events is associated with hurricane and tropical storm response activities. Hurricane response activities include activating and staffing the regional incident response centers and entering the monitoring phase of normal mode, dispatching satellite communications equipment to potentially affected plants, and sending regional inspection staff to relieve resident inspectors at the potentially affected facilities. The team found that power reactor facilities are designed for hurricane conditions and are generally required by plant procedures to shut down hours before the onset of hurricane force winds at the site and implement emergency plan procedures in advance of a hurricane’s arrival. Accordingly, experience shows that plants sustain hurricane force conditions with very limited reduction in plant safety margins. The team recommended that, except for the most severe hurricanes (e.g., Category 4 or 5), tropical storm and hurricane monitoring (i.e., continuous incident response center staffing) not be conducted whenever emergency onsite AC power systems are verified fully operable at the potentially affected facilities. Hurricane paths should be tracked sufficiently and solely to ensure that satellite communications are pre-positioned and the resident inspectors are relieved, as needed, at the potentially affected facilities.

A Commission policy statement on NRC's response to accidents occurring during the transportation of radioactive material references a memorandum of understanding between the NRC and the U.S. Department of Transportation. The memorandum of understanding identifies the NRC as the lead Federal agency for investigating the cause of the event and preparing a report. The policy states that the States have the primary responsibility for protecting health and safety of its citizens from public hazards and that recognition of the responsibilities for radiation hazards is reflected by the existence of an appropriately designated State agency chartered with the responsibility of responding to radiological emergencies. The team found that not all regional staff were fully cognizant of the policy and do not always seek and obtain State support in response to low-consequence transportation accidents. The team recommended that actions be taken to ensure appropriate NRC reliance on States in response to accidents occurring during the transportation of radioactive material in accordance with the established policy.

Agreement States have expressed concern about providing immediate Internet access via the NRC external web site to limited preliminary information on events reported to the States by their licensees. Although an event may be reportable to the NRC within 24 hours, it may not involve an immediate threat to health and safety. This practice has resulted in a lack of sufficient time for Agreement States to collect and review additional information needed to evaluate the preliminary event information before public inquiries begin. The team recommended that the staff implement a reasonable time delay (e.g., 24 hours) in the posting on the Internet 24-hour nuclear material event reports and that State regulators be reminded that current OSP guidance allows the States up to 24 hours after notification by their licensee in which to notify the NRC's HQ Operations Center of the occurrence of a "significant" nuclear material event.

INCIDENT RESPONSE READINESS ACTIVITIES

The SA team conducted a broad-based review of Incident Response Program readiness (preparation) activities for power reactor, FCF, and nuclear material incidents. The SA team's findings and its recommended initiatives in the area of response readiness activities are documented in Section 5.0 of the SA report and are summarized below.

Program Development and Response Coordination

The team found that close and coordinated interaction between the Incident Response Program office and the major program offices that is needed to achieve efficiency and effectiveness in development and implementation of the response program does not always occur. Further, Management Directive 8.2 and NUREG-0325 are inconsistent with respect to organizational responsibility for development of the nuclear material Incident Response Program policy and guidance documents. The departure of the AEOD staff member who provided the incident response coordination activities between AEOD and NMSS significantly contributed to materials and FCF response program development weaknesses identified by the team. The team concluded that as NRC oversight of Department of Energy (DOE) facilities expands, sufficient and dedicated staffing in the Incident Response Program office, clarity in office roles and responsibilities, coupled with close interoffice coordination, will be needed to ensure efficient and effective development of the incident response procedures for the diverse spectrum of NMSS regulated activities. The team recommended that: (1) NRC's organization and program documents be revised in order to make the office roles and responsibilities consistent regarding the Incident Response Program; (2) a nuclear material and FCF response coordinator be reestablished in the Incident Response Program office; (3) the on-going improvement of incident response coordination activities between NMSS and the Incident Response Program office receive continuing emphasis; and (4) any documents that provide formal policy or procedural guidance on the incident response function be closely coordinated with, or issued by, the Incident Response Program office.

Incident Response Plan and Procedures

The team found that NRC's Incident Response Plan (NUREG-0728) was last revised in 1987. Since 1987, significant changes have occurred in the response plans of other Federal agencies and in NRC's responsibilities. Additionally, the plan, including response modes, was not developed to address the special characteristics of significant material incidents. The team recommended that NUREG-0728 be revised to address: (1) responses to the full spectrum of incidents for which the NRC may be the lead Federal agency (e.g., nuclear material, transportation, research reactor, and spent fuel); (2) recent revisions in other Federal plans and agreements; and (3) any changes to the concept of operations resulting from decisions on the SA initiatives. Additionally, the team recommended that implementing procedures be established for any new response concept(s) developed for nuclear material, transportation, research reactor, or fuel storage incidents.

Incident Response Program Plan

The team found that there is no integrated NRC-wide program plan that documents and assigns organizational responsibilities for significant Incident development and implementation activities of the Response Program. Additionally, not all offices explicitly include all significant Incident Response Program support activities and resources in their annual operating plans and budgets. Occasionally, this has resulted in difficulty in obtaining organizational support for responder participation in training and exercises, and assistance in development of response tools or procedures. The team recommended the development and maintenance of an integrated Incident Response Program plan and that planned office activities, accomplishments, and resources that support the program plan be documented annually in office operating plans.

Maintenance and Development of the Implementing Procedure

Recent procedure revisions have not always been fully evaluated by the Incident Response Program office staff and response teams regarding the interdependency of procedures. Additionally, routine procedure audits are no longer being conducted. The reduced level of quality assurance has resulted in the introduction of procedural conflicts that were not detected until the procedures were used. The team recommended that response procedure revisions be validated and verified by the Incident Response Program office, the regions, response teams, and response coordinators for consistency before they are implemented.

NRC Responder Training and Exercises

The team identified several quality issues and cost issues associated with NRC responder response training and conduct of exercises. The initiatives recommended by the team to address the identified training and exercise issues include:

- Conduct an analysis to provide a firm basis for establishing NRC response training requirements for NRC response functions and activities. The assessment should employ recognized methods for determining the type and frequency of response courses and exercises needed to maintain adequate responder proficiency. This assessment should include a determination as to whether any NRC response personnel are required to take the hazardous material response training specified by the Occupational Safety and Health Administration (OSHA) requirements.

- Establish and implement a formal NRC responder training program on the basis of the analyzed training needs. This effort should: (1) identify the training and qualifications required to perform each response position; (2) develop and implement a training program and formally document training materials to meet the identified training needs; (3) evaluate the trainee and training process to ensure that the training provided is effective; (4) incorporate lessons learned; and (5) periodically review the training to verify that NRC response personnel meet established training requirements.

- Upgrade the response training program by: (1) establishing an NRC-wide policy that attendance at required annual responder training is mandatory; (2) scheduling training courses in advance for all NRC responders; (3) conducting the fewest number of scheduled classes; and (4) conducting training to address immediate office needs, including FCF and nuclear material training for the HOOs and training on basic response concepts (reactor, FCF, and material emergencies) for all response managers, including the executive team.

- Develop a multi-year NRC exercise program. The program should periodically test all aspects of NRC response program proficiency. Exercises should have high fidelity in simulating all major responsibilities for a lead Federal agency, including communications with Congress, the White House, the public (media), the States, and the heads of other Federal agencies. Exercises should be periodically conducted for all types of emergencies having the potential for serious health, safety, and safeguards consequences. Exercises should include material and FCF events, address the full Federal response under the FRERP and the Federal Response Plan, and highlight events requiring interaction with other agencies. The use of drills, tabletop exercises, or other methods should be increased to provide team and integrated training as resources allow.

- Base the periodicity of full participation exercises on maintaining NRC responder proficiency rather than on maintaining State responder knowledge of NRC response functions and activities.

Federal Coordination

The team found that the level of Federal activity related to emergency response planning and coordination requiring NRC involvement has significantly increased. The Incident Response Program office staff periodically attends briefings and HQ and regional coordinating meetings to stay informed and to keep the response staff of other Federal agencies informed. There is a concern that the staff resources and/or the approach may not be sufficient to ensure that the NRC's response program is sufficiently well coordinated with the changing Federal response. The team recommended that standard guidance and training documents be developed on NRC's response coordination under the various Federal plans and agreements. Training should be provided to Federal regional personnel who may support or interact with an NRC lead response. The NRC's training should be incorporated into the Federal Emergency Management Agency's (FEMA's) standard radiological response training package, and the nationwide Emergency Education Network broadcasts should be evaluated as a cost-effective approach for providing the training.

State Outreach

The team found that a relatively high turnover rate for State responders adversely affects the maintenance of the cadre of State responders who have experienced either NRC State outreach activities or NRC incident response exercises for reactors. Accordingly, the existing approach to State outreach and reactor exercises do not effectively sustain the desired level of knowledge of the NRC and Federal response among State responders. The team recommended that the NRC seek to be more efficient in conducting State outreach using approaches that reach all the States (i.e., including those States not within an EPZ for power reactors) and a larger number and type of (i.e., materials incident) State responders during outreach training and orientation sessions. Strategies suggested included combining State outreach training with Nuclear Material Events Database training or in association with annual conferences or meetings widely attended by State responders, using NRC's video conferencing equipment or FEMA's Emergency Education Network nationwide broadcasting system.

Headquarters Operations Officers

The Incident Response Program budgets 7 FTEs for the HOO function. However, the HOOs are actively involved in incident response activities or incident response readiness activities for only small percentage of the time they are on shift. Most of the time, they are involved in either non-emergency notifications or waiting for emergency notifications. Also, some Agreement States believe that the HOOs do not always understand reported material events and that they do not understand materials events as well as reactor events. The team recommended additional technical training for the HOOs to enhance their performance in understanding materials events and in taking materials event notifications. Finally, the team recommended that the budget for HOO shift coverage include both an incident response component and a non-incident response component in recognition that only a small percentage of shift time is spent in response to actual incidents. Recognizing both components would establish a budget model in which to consider and evaluate the assignment of lower priority optional HOO tasks (e.g., events assessment) that would increase overall HOO utilization.

Information Technology Infrastructure

The team identified several quality and cost issues concerning the information technology associated with the Incident Response Program. Significant initiatives recommended by the team to address the identified information technology issues follow:

- For plants entering decommissioning, generically determine on a safety and risk basis if the direct access lines (except the emergency notification system) might be safely disconnected sooner than is currently permitted by licensee emergency plans and implementing procedures.

- Conduct a benchmark analysis of the HOC information technology systems (i.e., review best practices for comparable systems in the public and private sectors) to identify opportunities for more effectively and efficiently managing the systems (e.g., reduce the cost of maintenance).

- Consider conducting a drill without OCIMS to determine the capability of NRC participants to perform their duties given the loss of the system.

- Discontinue the reactor safety assessment system and remove the equipment from the HOC.

- Make the NRC's automated call-out systems operational and place them into service as soon as possible. Resources should be provided to provide for their continued maintenance.

Incident Response Facilities

An SA team reassessment of the need for the four regional Incident Response Centers (IRCs) found that no substantive changes had occurred in the basis for the costs and benefits documented in a 1997 study, which had concluded that there would be little cost savings if three of the four regional IRCs were eliminated. The team recommended that the four regional IRCs be retained if the current concept of operations is retained. However, if a decision is made to reduce the regional incident response role, such as by a change in the concept of operations, the need for the regional IRCs would be diminished and the 1997 IRC cost-benefit analysis should be reevaluated.

Redundant copies of emergency plans and emergency plan implementing procedures (EPIPs) for all sites are maintained at the HOC, the regional offices, and the site resident inspector offices. Copies of these documents are also available on the Nuclear Documents System (NUDOCS) in HQ and each regional office, although searching for, retrieving, and printing the documents is time-consuming. The team recommended that site emergency plans and EPIPs be maintained only at the regional and resident inspector offices and that an evaluation be conducted on whether the emergency plans and EPIPs could be maintained and accessed in a timely and reliable manner via the Agency Wide Documents Access and Management System (ADAMS) when it becomes operational.

The overview material for each power reactor site that is contained in the plant information books (PIBs) and the electronic plant information books (EPIBs) on the NRC Web site contain simplified plant system diagrams and detailed plant system data that are not of verified accuracy. No formal mechanism was put in place to ensure maintenance of the PIBs. Incorrect drawings could result in erroneous assessment and the transmission of incorrect information to outside organizations. The team recommended that the PIBs and EPIBs be eliminated and that the staff rely on the final safety analysis reports (FSARs) and the updated final safety analysis reports (UFSARs) for the plant information needed during a response.

The SA team, where possible, also estimated and presented the savings that might be achieved for each of the above-recommended initiatives that had a potential for lowering the costs of program development, maintenance, or implementation.

AREAS OF SPECIAL INTEREST IDENTIFIED BY THE CHAIRMAN

The Chairman requested that a number of specific items be included in the SA. The assessments for these specific items were performed by the staff of the Incident Response Division (AEOD). The results of these assessments are documented in Appendix A of the SA report.

ABBREVIATIONS

ADAMS	Agency-wide Documents Access and Management System
AEA	*Atomic Energy Act of 1954*
AEOD	Analysis and Evaluation of Operational Data, Office for (NRC)
AIT	augmented inspection team
ALOHA	aerial locations of hazardous atmospheres
AMS	aerial measurement system
AO	abnormal occurrence
AUTOS	Agency Upgrade of Technology for Office Systems
BRG	Budget Review Group
BT	base team
CAMEO	computer aided management of emergency operations
CDRG	Catastrophic Disaster Response Group
CFR	Code of Federal Regulations
DAL	direct access line
DHHS	United States Department of Health and Human Services
DNMS	Division of Nuclear Material Safety (NMSS)
DO	duty officer
DOE	United States Department of Energy
DOT	United States Department of Transportation
DSO	director of site operations
EAL	emergency action level
EDG	emergency diesel generator
EDO	Executive Director for Operations (NRC)
EENET	Emergency Education Network
EMI	Emergency Management Institute (FEMA)
ENS	emergency notification system
EO	emergency officer
EOF	emergency operations facility
EPA	United States Environmental Protection Agency
EPIB	electronic plant information book
EPIP	emergency plan implementing procedure
ERA	emergency response assistant
ERC	emergency response coordinator
ERDS	emergency response data system
ERP	emergency response procedure
EST	emergency support team (FEMA)
ET	executive team
ETS	emergency telecommunications system
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FCF	fuel cycle facility
FCO	Federal coordinating officer
FCST	fuel cycle safety team
FEMA	Federal Emergency Management Agency

FFE	full Federal field exercise
FR	*Federal Register*
FRERP	Federal Radiological Emergency Response Plan
FRMAC	Federal Radiological Monitoring and Assessment Center
FRP	Federal Response Plan
FRPCC	Federal Radiological Preparedness Coordinating Committee
FSAR	final safety analysis report
FTE	full-time equivalent
FTS	Federal telecommunications system
FY	fiscal year
GDP	gaseous diffusion plant
GIS	geographic information system
GRT	general response training
HAZMAT	hazardous material
HAZWOPER	hazardous waste operations and emergency response
HOC	headquarters operations center
HOO	headquarters operations officer
HPN	health physics network
HQ	headquarters
HVAC	heating, ventilation, and air conditioning
IAEA	International Atomic Energy Agency
IAT	information assessment team
IIT	incident investigation team
IMPEP	integrated materials performance evaluation program
INEL	Idaho National Engineering Laboratory
IRC	incident response center
IRD	Incident Response Division (AEOD)
JOC	joint operations center
LAN	local area network
LFA	lead Federal agency
MD	management directive
MPH	miles per hour
NCP	national contingency plan
NEA	Nuclear Energy Agency
NFS	Nuclear Fuel Services
NMED	nuclear material event database
NMSS	Nuclear Material Safety and Safeguards, Office of (NRC)
NORM	naturally occurring radioactive material
NPA	nuclear plant analyzer
NPP	nuclear power plant
NPR	National Performance Review for Reinventing Government
NRC	United States Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation, Office of (NRC)
NRT	national response team
NUDOCS	nuclear documents system
NUMARC	Nuclear Management Resources Council

OCIMS	operations center information management system
OCIO	Office of the Chief Information Officer (NRC)
OEDO	Office of the Executive Director for Operations (NRC)
OGC	Office of the General Counsel (NRC)
OPA	Office of Public Affairs (NRC)
OSHA	Occupational Safety and Health Administration
OSC	onscene coordinator
OSP	Office of State Programs (NRC)
PAR	protective action recommendation
PIB	plant information book
PD	projects director
PL	Public Law
PM	program or project manager
PMT	protective measures team
PN	preliminary notification
RA	regional administrator
RASCAL	radiological assessment system for consequence analysis
RCM	response coordination manual
RCS	response computer system
RCT	response coordination team
RDO	regional duty officer
RES	Nuclear Regulatory Research, Office of (NRC)
RI	resident inspector
RIAT	regional information assessment team
RRT	regional response team
RSAO	regional State agreements officer
RSAS	reactor safety assessment system
RST	reactor safety team
RTM	response technical manual
SA	self-assessment
SALP	systematic assessment of licensee performance
SARC	Strategic Assessment and Rebaselining Committee
SNM	special nuclear material
SRI	senior resident inspector
ST	initial site team
TTD	Technical Training Division (AEOD)
TMI	Three Mile Island
UFSAR	updated final safety analysis report
USDA	United States Department of Agriculture
WMD	weapons of mass destruction
WNP-2	Washington Nuclear 2
Y2K	year two thousand (2000)

SELF-ASSESSMENT TEAM

Program Area:	Incident Response Function
Self-Assessment Period:	June 1, 1998 through July 31, 1998
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[1] Charles Miller, Jack Roe, and John Stolz also participated in Management Oversight Group Meetings for NRR

1.0 INTRODUCTION

1.1 Background and Basis for the Self-Assessment

In 1995, the U.S. Nuclear Regulatory Commission (NRC) conducted a review of the Commission's major regulatory functions in connection with the National Performance Review for Reinventing Government (NPR). Specifically, the purpose of this review was to identify programs as potential candidates for efficiency improvement. As a result of the review, the NRC's NPR task force report, SECY-95-154, recommended seven programs for further detailed review for efficiency improvement. The Commission responded that the programs identified for improvement should be considered as part of the NRC's Strategic Assessment and Rebaselining initiative.

Among the seven programs, SECY-95-154 identified specific efficiency improvements for the Incident Response Program. As a result, the NRC staff has since reviewed the recommendations, and either has implemented or is in the process of implementing the specific efficiency improvements, as appropriate.

During the assessment of the NRC's Incident Response Function as part of the NRC's Strategic Assessment and Rebaselining initiative, the staff identified three "related strategic issues":

(1) What measures should the NRC take to maintain a sufficient planning and response capability for the nuclear industry, State and local authorities, and the Federal government in the face of growing economic pressure and improving safety performance?

(2) How would the NRC develop compensatory measures in the event of a reduction or loss of participation by Federal agencies as a result of budget restrictions?

(3) Is the degree of NRC incident response capability for materials and fuel facility emergencies consistent with the risk associated with the activities?

Additionally, there is growing Congressional pressure on the NRC to reduce resources across all program areas. Accordingly, on the basis of recent staff interaction with the Commission, the Office for Analysis and Evaluation of Operational Data (AEOD, the Incident Response Program office) was requested to conduct a broad self-assessment (SA) of the NRC's incident response function to identify initiatives that increase its efficiency and effectiveness.

1.2 Goals and Objectives for the Self-Assessment

The overall goal and primary focus of the SA was to identify initiatives[2] to improve the efficiency[3] and effectiveness[4] of the Incident Response Program. Specifically, assessing the incident response functions and incident response readiness activities and how they are implemented achieve the following purposes: identify activities that do not critically contribute to the success of the incident response function or incident response readiness activities; recognize excess capacity or duplication of efforts that is not required to achieve measurable outcomes or program outputs; seek approaches that can deliver services more economically; re-engineer work processes to improve overall efficiency and effectiveness. Strategic initiatives[5], although not an explicit goal or focus of the SA, may also be identified and recommended.

1.3 Scope of the Self-Assessment

The SA team is chartered to identify initiatives that would significantly improve the effectiveness and efficiency of the NRC's processes for responding to incidents and emergencies involving facilities and processes licensed by the NRC or an Agreement State. This includes power reactors, fuel cycle facilities, transportation, spent fuel storage, research reactors and industrial, medical and research uses of byproduct material. Initiatives to improve the interfaces with the NRC's response partners, such as State and Federal agencies, are also included in the SA scope. Within the broad-based scope of the SA, the team is to include initiatives identified by the Chairman, as well as applicable "related strategic issues" from the NRC's Strategic Assessment and Rebaselining initiative. In particular, the Chairman requested that the SA consider whether incident response procedures were in conformance with the Chairman's authorities and responsibilities (as described in the Reorganization Plan of 1980) and whether initiatives could be identified and implemented to ensure that the roles and responsibilities of the Chairman and executive team (ET) leader are implemented proficiently in an emergency (see Appendix A). The "related strategic issues" identified from the NRC's strategic assessment and rebaselining initiative that are within the SA scope are:

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[2] Identified initiatives are marked "***Initiative***" in the report. See Section 6 for additional information on identified initiatives.

[3] The degree to which the result (output/outcome) meets expectations with the least amount of input (resources).

[4]The degree to which the result (output/outcome) meets expectations. It involves focusing on and performing well those incident response functions and incident response preparation activities that are most critical to achieving the program goals. Significant program cost savings can also be achieved.

[5] A change in selected NRC responsibilities for responding to an emergency (e.g., devolve a specific NRC responsibility to another Federal agency).

(1) What measures should the NRC take to maintain a sufficient planning and response capability for the nuclear industry, State and local authorities, and Federal Government in the face of growing economic pressure and improving safety performance?
(2) Is the degree of NRC incident response capability for materials and fuel facility emergencies consistent with the risk associated with the activities?

Finally, a number of initiatives and areas of special interest were identified by NRC headquarters (HQ) office directors and regional administrators (RAs) for potential inclusion in the SA. NRC senior manager issues were also addressed, as appropriate, within the overall framework of the SA methodology.

1.4 Self-Assessment Methodology

To the extent practical, the SA utilized the methodology for NRC's program assessments that were being developed by Arthur Andersen Consulting, under contract to the NRC. Specifically, that methodology identifies opportunities to improve the effectiveness and efficiency of the NRC's existing programs. Toward that end, the methodology defines effectiveness as *working on activities that are necessary and sufficient to deliver the desired results, while eliminating noncritical efforts or duplication of efforts*. In addition, the methodology defines efficiency as *conducting work activities in the best fashion with the least amount of resources*. The methodology involves seven basic steps, as follows:

(1) An important first step of the SA methodology is to *identify significant "constraints" or "boundary conditions"* that are imposed on the Incident Response Program. This would include Federal statutes, NRC regulations, endorsed Federal interagency agreements or plans (e.g., the Federal Radiological Emergency Response Plan, FRERP), memoranda of understanding, previous Commission policy decisions, international treaties, and so forth. Such constraints, unless relaxed or revised, might restrict desirable improvements in the Incident Response Program.

(2) The second step of the SA methodology is to *identify or develop measurable outcomes* for the Incident Response Program, including metrics (performance indicators) to determine whether program success is being achieved. Measurable outcomes and metrics provide an objective basis to assess whether program activities are critical or not critical to program success, and provide a means to objectively assess whether alternative approaches to conducting incident response functions or readiness activities meet program goals and objectives. For example, a maximum allowable time for an initial site team (ST) to reach the scene of the emergency might be specified as a metric to assess alternatives for composing and dispatching initial site teams, in lieu of "as soon as possible."

(3) The third step of the SA methodology is to *conduct an effectiveness review* to determine which incident response functions and readiness activities are essential (i.e., critical activities) to achieving the measurable outcomes. In principle, each response function and readiness activity is assessed to determine if it is critical to meeting the Incident Response Program goals (measurable outcomes). Activities that do not critically

support the program goals are identified as candidates for elimination. Activities that are critical to the success of the program are also identified. In addition, resources (i.e., full-time equivalents (FTEs) and dollars) expended for critical and noncritical activities are identified to assess where resources are spent ineffectively or where they may be redirected to better achieve program success.

(4) The fourth step of the SA process is to *conduct an efficiency review*. The purpose of the efficiency review is to identify where incident response functions or incident response readiness activities can be improved from the standpoint of quality, cost, timeliness, reliability, and so forth. Work process flow diagrams of response functions or response readiness activities should be obtained (if available) and evaluated for the most critical and resource intensive response or readiness activities. This evaluation should also identify inefficient processes (in terms of cost, quality, timeliness, etc.), as well as opportunities to improve short-term and long-term efficiency or effectiveness.

(5) The fifth step of the SA process is to *identify and develop alternative response or readiness processes* that could offer the potential for meeting the program success criteria (as defined by the measurable outcomes and metrics) but at potentially lower cost and/or with greater quality, timeliness, etc. "Best practices" from other agencies and organizations may be identified and included among the alternatives.

(6) The sixth step in the SA process is to *analyze the alternatives* in terms of their estimated costs and projected benefits (e.g., quality, timeliness, reliability) to assess increased (or decreased) effectiveness or efficiency. Alternative response and readiness processes may then be ranked on the basis of the cost-benefit analysis.

(7) The final step in the SA process is to *provide recommendations* on the basis of the alternative response and readiness processes that meet outcome objectives, as defined by the measurable outcomes, with the least cost.

The above-described SA methodology, including the identified recommended alternatives, provided the context and framework within which the SA team evaluated the NPR recommendations, Strategic Assessment and Rebaselining Committee (SARC) "related Commission issues," and RA and HQ office director issues and initiatives. The main sections of this report present the SA team's evaluation findings, following the general sequence of steps in the SA methodology.

2.0 DESCRIPTION OF THE INCIDENT RESPONSE PROGRAM

Background

Following the accident at Three Mile Island (TMI) on March 28, 1979, the U.S. Congress and various studies found that the NRC was not adequately prepared to deal with emergencies at nuclear power plants. The legislative history of Public Law (PL) 96-295 (the *NRC Authorization Act for Fiscal Year 1980*), states that this finding was demonstrated in a number of ways during the TMI accident. Specifically, the cited examples include the delayed arrival of the NRC's principal technical experts onsite; delays in the availability and coordination of Federal and non-Federal support; and the Commission's inability in many instances to obtain and relay accurate and timely information. Consequently, PL 96-295 directed the NRC to develop a plan for the NRC's response to accidents at NRC-licensed utilization facilities. Moreover, the U.S. Senate indicated that the plan must provide for prompt notification of an emergency by the plant operator; prompt determination by the NRC that such an emergency exists; prompt dispatch of an NRC emergency response team to the plant site; speedy and accurate communications within the NRC and between the NRC and responsible Federal, State, and utility officials and; accurate monitoring of radiation levels onsite. In addition, PL 96-295 directed the President to prepare and publish a National Contingency Plan (NCP) to provide for expeditious, efficient, and coordinated action by appropriate Federal agencies to protect public health and safety in case of accidents at any utilization facility.

The National Contingency Plan became the FRERP, which was developed by the Federal Emergency Management Agency (FEMA) and signed by the NRC and 17 other Federal agencies. Under the FRERP, the NRC is the lead Federal agency (LFA) during a radiological emergency involving an NRC licensee or an Agreement State licensee. The LFA has the responsibility to coordinate the response of all Federal agencies responding to the radiological emergency. Leading and coordinating all aspects of the Federal emergency response includes responsibility for onscene monitoring and coordination; assisting State and local governments; ensuring that FEMA and other Federal agencies assist the State and local governments, as requested; ensuring that protective and monitoring measures are taken to mitigate offsite consequences; and coordinating public, international, Congressional, and White House information.

As a result of these circumstances, the NRC initiated a program and took the following actions to significantly improve its capability to respond to emergencies involving NRC licensees:

- Establish an organization dedicated to the development and maintenance of an effective and cohesive NRC response program.
- Improve communication between the NRC and nuclear power plants and some fuel cycle facilities.
- Establish a headquarters operation center (HOC) staffed by trained, professional operations officers.

- Develop a comprehensive response capability with NRC HQ and regional response elements integrated into a broader Federal response.

2.1 Incident Response Concept of Operations

As directed by PL 96-295, NRC published NUREG-0728, "NRC Incident Response Plan." The plan assigns responsibilities and establishes selected response concepts such as the response modes. The plan was written to address the response to nuclear power plant emergencies but is also valid for fuel cycle facilities with emergency plans. While the plan, including incident response modes, was not developed in consideration of most effectively addressing the characteristics of significant nuclear material incidents, incident response procedures for material incidents are, in fact, based on the response concepts and framework of response modes contained in NUREG-0728. Based on the plan, detailed procedures were developed for: (1) processing event notifications, (2) making initial assessments, (3) determining the level of NRC's response, and (4) implementing NRC's response.

Event Notification

NRC regulations require power reactors and fuel cycle facilities (FCFs) to report emergency declarations to the NRC's HOC immediately after notifying appropriate State and local authorities, but within 1 hour of declaring the emergency. By regulation and implementing procedures, power reactors and FCFs also report abnormal conditions to the HOC. NRC material licensees are also required by regulation to report "significant[6]" events to the HOC within 24 hours or less. In accordance with compatible regulatory reporting requirements, Agreement States also require their material licensees to report significant events to the appropriate regulatory agency within 24 hours or less. NRC guidance to the Agreement States requests that Agreement States notify the NRC of significant events within 24 hours of receipt of notification from an Agreement State licensee. The HOC is continuously staffed 24 hours a day, 7 days a week, throughout the year, with highly trained Headquarters Operations Officers (HOOs) who take these notifications. The HOOs utilize detailed written procedures which govern their receipt and response to the full spectrum of reportable events. This includes emergencies declared in connection with power reactor and fuel cycle facilities and incidents involving material licensees and transportation events.

The current evaluation and decision-making process for reported events is shown in Figure 2.1. The process involves a series of steps, each of which requires the HOO to establish a new conference call (i.e., bridge) or add participants to an existing conference call. The process does not proceed to the next step until it is decided that the situation may warrant activation. The four step process is as follows:

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[6] A "significant" event is defined as any event or condition involving licensed nuclear material that does, will, or may, impact health and safety. Licensees are required to report incidents that fall under this category to the appropriate regulatory agency within 24 hours or less.

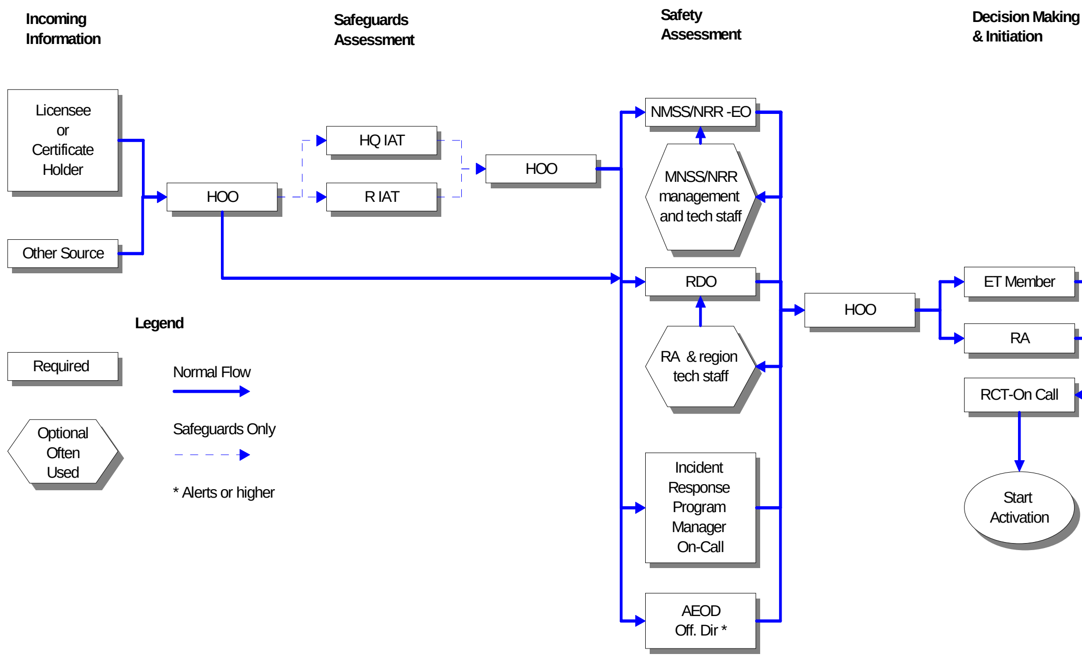

Figure 2.1 Current Response Decision-Making Process

(1) The HOO takes the initial event report and determines, on the basis of procedure, if the event requires a safeguards or safety assessment. If the event requires a safeguards assessment, the information assessment team (IAT) is contacted. If the event requires a safety assessment, the NRR (or NMSS) emergency officer (EO) and regional duty officer (RDO) are contacted.

(2) The HQ IAT and regional IAT (RIAT) members assess the safeguards-related aspects of the event and decide if activation may be warranted. This step is bypassed if there are no safeguards-related concerns.

(3) The EO and RDO assess the safety significance and other important aspects (e.g., public interest) of the event and decide if the event warrants activation if any. The manager on-call from the Incident Response Program office (and director of the Incident Response Program office for an alert or higher) is added to the bridge in this step to ensure that response protocols are followed. In addition, the EO may request that the project manager (PM), management, and technical experts be added to the conference call. The RDO may drop off the bridge to consult with regional higher management.

(4) If the event appears to warrant activation, an ET member and the RA are called and briefed. The ET member and RA make the decision on the level of activation. The response coordination team (RCT) member on-call is also added at this point so they can record the decision and initiate the activation. The last step in the process has almost become proforma; since, the NRC almost always initiates at some level of

activation (e.g., monitoring phase of normal mode, standby mode) once the ET is involved.

Detailed procedures have been developed for decision-makers including the EO, RDO, RA, Incident Response Division (IRD) manger, Executive Team (ET) member and RCT member on-call. These procedures address the full spectrum of reportable events. However, the guidance for assessing significant material events is not well developed. For example, the HOOs refer all material events to the NMSS EO for assessment.

The response modes are “normal mode,” “standby mode,” “initial activation mode,” and “expanded activation mode.” These modes are used in connection with events at power or research reactors, FCFs, certificate holders, and material licensees, as follows:

- Normal Mode

  Normal mode is the lowest level of response. Should an event occur which is well understood and no significant safety concerns are evident, but some degree of attention is appropriate, the NRC may choose to monitor the event in this mode. If increased monitoring and assessment is required in this mode, a small group of NRC experts will respond to continuously monitor the incident from HQ and the regional office, with the regional office leading the NRC response. HQ supports the region and may provide a few selected technical experts, as needed, to monitor the event. This continuous monitoring is referred to as the “monitoring phase of normal mode.”

- Standby Mode

  Standby mode is the next level of response. This mode is entered when it is determined that an event is sufficiently uncertain or complex, and that the situation needs to be watched and evaluated by a wider variety of NRC specialists. The HOC is fully staffed and at least one ET member reports to the HOC to direct the HQ response. In standby mode, the region transfers the lead for NRC response to HQ and focuses on preparing to send a team to the site of the incident or emergency. The HQ response organization performs technical analyses and coordinates the response with technical teams and liaison and support staff who are called into the HOC.

- Initial Activation Mode

  If it is necessary for the NRC response to be led from the site, the NRC will enter into initial activation mode. In this mode, the region dispatches an initial site team to the site of the incident or emergency. The HQ response organization continues to lead the NRC response, and the HOC is fully staffed (including the full ET). Representatives from other Federal agencies, including the United States Department of Agriculture (USDA), the United States Environmental Protection Agency (EPA), the United States Department of Energy (DOE), and FEMA will also report to the HOC. The HQ response organization will conduct an independent assessment of the event and protective action recommendations (PARs). The HQ response organization will also coordinate all event-related information provided to the White House, Congress, other Federal and State agencies, the media, international organizations, and others. In addition, the HOC will coordinate all Federal assistance provided to the State and facility. The NRC Chairman will normally direct the Federal response from the HOC until the initial site team is in place at the scene.

- Expanded Activation Mode

  When the NRC's initial site team arrives on scene and accepts authority and responsibility for leading the Federal response, the NRC enters into the expanded activation mode. In this mode, the lead for directing assessments, coordinating with the Federal agencies at the scene, and interacting with the media shifts from the NRC HQ response organization to the initial site team led by the Director of Site Operations (DSO). Typically, the Chairman will appoint the RA in the affected region to serve as the DSO. The DSO will normally direct NRC site activities from a location near the scene of the incident.

  During expanded activation, the HOC provides logistical and technical support to the initial site team, as necessary. During this mode, the initial site team may also coordinate radiological monitoring provided by the DOE as requested by a State or the NRC. The DOE is capable of providing field teams, airborne monitoring, and a Federal Radiological Monitoring and Assessment Center (FRMAC) to fully coordinate Federal monitoring.

  In the event that the President declares an emergency or disaster, the NRC DSO will coordinate with the Presidentially appointed Federal Coordinating Officer (FCO). The FCO is responsible for coordinating all Federal assistance. However, the NRC will continue to coordinate the Federal radiological response. It may also be necessary to coordinate with the Federal Bureau of Investigation (FBI) or EPA at the scene if the event involves a criminal act or a hazardous material release, respectively.

It should be noted that, in the 18 years since the Incident Response Program was upgraded following the accident at TMI, the NRC's response has never entered into the initial activation mode or the expanded activation mode. However, there have been events involving onscene response such as the 1986 uranium hexafloride (UF_6) release at the Sequoyah fuels facility.

2.2 Incident Response Preparation Activities

The following response preparation (i.e., readiness) activity areas are intended to ensure that the NRC is prepared to respond effectively to an incident at any time.

- *Incident Response Program Development and Response Coordination* — These activities include maintaining the incident response plan, management directive, operating procedures, concept of operation, rosters of qualified response personnel, technical tools and procedures, and references.

- *NRC Responder Training and Exercises* — These activities ensure that the NRC response facilities are operational, response procedures are effective and easily implemented, and responders are capable of effectively carrying out their response duties and responsibilities in a realistic environment.

- *Federal and International Coordination* — These activities include maintaining and revising interagency plans and agreements, maintaining working relationships with and among Federal agencies to ensure a coordinated response to a radiological incident, and coordinating international activities such as notifications.

- *State Outreach* — These activities include providing continuing training to ensure that State responders understand the NRC's role, the technical and administrative aspects of responding to radiological incidents related to NRC-licensed activities, and the Federal resources and assets that are available to a State in an emergency. Activities are associated with the power reactor and gaseous diffusion plant response area.

- *Headquarters Operations Officers* — These activities include round-the-clock coverage by the HOOs to receive notification of reportable events and radiological emergencies and activities which ensure that HOOs are prepared to effectively perform their response duties.

- *Regional Emergency Response Coordinator* — These activities ensure that regional response personnel are prepared to respond effectively to a radiological incident, regional response procedures are maintained, and regional equipment and facilities are kept in good working order to respond to an incident or radiological emergency in the region.

- *Emergency Response Information Technology Infrastructure Support* — These activities include maintaining telecommunications and computerized information management systems in the HOC so that they are highly reliable and available at all times. In addition, these activities include supporting some computer systems in the regions and ETS at the sites.

- *Emergency Response Facilities* — These activities ensure that the HOC and regional IRCs are "response ready" at all times.

2.3 Incident Response Budget

The NRC budgets resources (FTE and dollars) for each of the response preparation activity areas described in Section 2.2. The resources for these incident response readiness activities in fiscal year (FY) 1999 and prior years are contained in the budgets of several offices, including AEOD, NMSS, and the Office of State Programs (OSP). However, not all offices and none of the regions are budgeted for the full extent of resources expended for incident response, although this resource burden can be significant.

At the time of the SA the Incident Response Program office's FY 1999 budget for incident response readiness activities was as shown in Table 2.3-1 below. The unbracketed resources are those budgeted by the Incident Response Program office for reactor response preparation activities. The bracketed resources are those budgeted by the Incident Response Program office for material incident response preparation activities. The line item for NRC responder training and exercises reflects the resources budgeted by the Incident Response Program office for it to provide classroom training to NRC HQ and regional responders and to coordinate the preparations for and implementation of HQ responder participation in licensee emergency response exercises. The total is about 1.9 FTEs for the reactor and material areas. However, this total does *not* cover the time (i.e., resources) that is spent by HQ and regional responders attending reactor incident response training courses or participating in reactor exercises involving HQ response teams, regional base teams or regional initial site teams. Additionally, the Incident Response Program office budgeted a total of 0.2 FTE for FY 1999 for it to respond to actual incidents (0.1 FTE for power reactor incidents and 0.1 FTE for material incidents). Except for the emergency response coordinators (ERCs), the resources shown in Table 2.3-1 reside in the Incident Response Program office. The ERCs are accounted for within the Incident Response Program office budget, but the staff reside in the four regional offices.

Table 2.3-1 Estimated FY 1999 AEOD Budget for Incident Response Program Readiness Activities

Incident Response Program Readiness Activity Area	**Resources** (FTE/$ for Rx* [Mat**])
Program Development and Response Coordination	2.0 [0.5]
NRC Responder Training and Exercises	1.7 [0.2]
Federal Coordination	1.1 [0.2]
State Outreach	1.0
Headquarters Operations Officers	7.0 13K
Regional Emergency Response Coordinator	4.0 [1.0]
Maintain HOC Information Technology Infrastructure	3.1 1940K
Maintain Response Facilities and Equipment	0.5
Total Incident Response ***	20.4 1953K [1.9]

* Reactor Program Area
** Nuclear Material Program Area
*** Does not include 0.2 FTE for IRD to respond to incidents.

The SA team reviewed a study conducted in 1997 by the IRD to determine the amount of regional resources expended annually for incident response activities above the amount budgeted for the regional ERCs. The team also reviewed the resources expended annually by HQ program offices that participate in Incident Response Program training and exercises. The combined results are shown in Table 2.3-2. In particular, Table 2.3-2 shows that the total labor resources expended *but not budgeted* by HQ and the regional offices was 3.0 FTEs for reactor incident response training and 5.1 FTEs for participating in reactor emergency response exercises. In addition, the AEOD study indicated that, in 1996, 2.9 FTEs were expended but not budgeted for the regions to respond to actual incidents. The Incident Response Program staff indicates that current response training and exercise resource expenditures are about the same today as they were in 1996.

Several RAs indicated that resources from other programs had to be used to support reactor responder training and exercise activities mandated by the Incident Response Program. That is, the resources directly allocated to Incident Response Program activities (i.e., the ERCs) were insufficient to support all response program activities. The FTEs expended annually for training, exercises, and actual response activities came out of the overall inspector training overhead or regional initiative budgets. In aggregate, the *unbudgeted* resources actually expended by NRR and the regions in support of the reactor Incident Response Program readiness and response activities is estimated by the SA team to be about 50 percent over the 20.4 FTEs shown in Table 2.3-1 that the Incident Response Program office budgets for the reactor incident response program.

Table 2.3-2 Total Unbudgeted[10] Resources for HQ and Regions - Reactor Response

Unbudgeted Training for HQ & Regions	3
Unbudgeted Exercises for HQ & Regions	5.1
Unbudgeted Incident Response for HQ & Regions	2.9
Total Unbudgeted for Incident Response	11

[10] Total reflects analysis of estimated training, exercise, and incident response FTE expenditures for 1996; 1 FTE = 2080 hrs; NMSS and OSP are not included.

In addition to the resources budgeted by AEOD, NMSS and OSP budget resources for response training and participation in exercises. NMSS informed the team that the aggregate of all activities related to incident response, investigation, exercise, and training are budgeted by NMSS on the basis of past experiences in expenditures. In addition, OSP includes within its budget resources for responders at HQ and the Regional State Liaison Officer staff to attend periodic incident response training and to participate in planned drills and exercises. OSP estimates 1.0 FTE for all HQ and regional staff. The NMSS budget model assumes approximately 5 weeks of training per FTE each fiscal year, and training related to incidents (response or investigation) is included in the 5 weeks. The NMSS budget does not separate functions for response and investigation. The resources budgeted by NMSS and OSP are shown in Table 2.3-3 below.

Finally, the resources (i.e., FTE, dollars) which individual Agreement States budget for incident response activities are, on a per licensee basis, generally proportional to the resources which NRC budgets for materials incident response activities."

Table 2.3-3 Resources Budgeted by NMSS and OSP for Nuclear Material Incident Response and Incident Investigation

Resources Budgeted for Incident Response and Incident Investigation (FTE)		
	FY 1998	FY 1999
NMSS (HQ)	2.7	3.1
NMSS (Regions)	6.6	6.6
OSP (HQ+Regions)	1	1
Total	10.3	10.7

3.0 PROGRAM GOALS, OBJECTIVES, AND CONSTRAINTS

This section presents those SA results that transcend all aspects of the Incident Response Program, including response and readiness activities in the power reactor, FCF, certificate holder, and material response areas. In particular, Sections 3.1 and 3.2 present the SA team's findings with recommended initiatives with respect to the measurable outcomes and external constraints on the program.

3.1 Team-Defined Program Goals and Objectives

The SA team found that measurable outcomes were not established for the Incident Response Program. However, as part of the AEOD Operating Plan[7] for FY 1998–1999, a number of output measures recently were established for selected response functions and response preparation activities. The status of operating plan output measures through the first quarter of FY 1998 indicates that, for the most part, the established output measures were met.

In the absence of measurable outcomes for the Incident Response Program, the SA team developed a set of incident response function goals and objectives to assist the team in performing the follow-on steps required by the SA methodology. Specifically, the SA team developed goals and objectives to provide a qualitative basis and framework to assess whether or not specific program activities were critical to the success of the program and whether potential alternative approaches to response functions and readiness activities might potentially achieve the team-defined program goals and objectives. The team established the following three program goals:

(1) Protect health and safety and the environment during an incident.

(2) Ensure that the NRC is prepared to respond to an incident.

(3) Ensure that there is public confidence in the NRC's incident response activities.

The first and third goals apply to the NRC's response function, while the second goal applies to the NRC's response readiness activities.

Additionally, the SA team established six subsidiary objectives for the NRC's incident response function, as follows:

(1) Ensure that measures are taken to mitigate offsite consequences.

(2) Monitor the incident and assess response activities.

(3) Communicate with, advise, and provide technical support to licensees, certificate holders, and State or local governments, as requested.

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[7] "FY 1998–1999 AEOD Operating Plan," Performance Plan Output Measures

(4) Coordinate and support Federal response activities.

(5) Communicate with Congress, the White House, the media, and the public.

(6) Ensure that sufficient qualified personnel, facilities, equipment, and procedures are ready to respond at any time.

Initiative: Establish measurable outcomes for the Incident Response Program. Alternatively (or as a first step), establish qualitative goals and objectives for the Incident Response Program.

Additionally, the team found that a commonly recognized working definition for “incident response” was not established and communicated to the NRC offices and staff involved in incident response activities. Therefore, there was a degree of uncertainty and differing views among the staff as to whether or not specific actions being taken following notification of an event or incident were “response” activities. For some nuclear material event notifications, the team observed that selected staff members viewed their monitoring and assessment activities as “response”-related, while the SA team viewed their actions not as a response activities but as followup (e.g., incident investigation, response performance evaluation, investigation performance evaluation) activities. This had any of the three possible effects:

(1) Staff performed followup activities after the response phase had ended, but considered their followup activities as response-related.

(2) Staff performed response and followup activities concurrently, but considered all activities to be response-related.

(3) Staff performed activities following an event notification that did not involve or require an incident “response,” but viewed their activities as response-related.

Also performing followup activities concurrently with response activities could have the potential to distract focus from timely response actions. Finally, a lack of clarity can cause the involved NRC staff to charge their time and effort inappropriately to the Incident Response Program area rather than the applicable followup area such as NRC incident investigation, NRC evaluation of NRC licensee (or State) incident investigation performance, or NRC evaluation of NRC licensee (or State) incident response performance.

To assist the team in evaluating response functions and activities separate and apart from non-response activities, the SA team developed the following definition for incident response:

> *Incident Response* — An ongoing occurrence for which there is an actual, potential, or perceived radiological health and/or safety risk, and for which one or more of the following is required:
>
> - mitigating onsite or offsite radiological consequences

- providing advice and technical support to licensees or State or local governments, as requested

- monitoring the incident and assessment of response activities

- coordinating and supporting Federal response activities

- communicating with Congress, the White House, the media, and the public

***Initiative*:** Establish, document in formal guidance, and communicate in NRC responder training, a clear definition of "incident response" so that the staff can recognize and understand its scope and the difference between response activities and followup (e.g., investigation, evaluation) activities. The definition should be consistent with the goals and objectives for the Incident Response Program.

3.2 External Constraints on Incident Response

The team conducted an extensive review of relevant reference documents to identify significant constraints or "boundary conditions" that are imposed on the Incident Response Program. Unless revised or relaxed, such constraints might have the potential to limit desirable effectiveness or efficiency improvements in the Incident Response Program.

The team found that an extensive number of constraints are imposed on the program. These constraints are documented in Federal statutes, NRC regulations, multiple inter-agency Federal emergency response planning documents signed by the NRC as a matter of policy (e.g., the FRERP), memoranda of agreement and memoranda of understanding with other Federal agencies, Commission policy decisions, and agreements with the International Atomic Energy Agency (IAEA) and other countries.

PL 96-295 and the FRERP provide the underlying basis for many of the constraints, since they requires the NRC to develop and implement an emergency response plan as discussed in Section 2.0. Under the FRERP, the NRC is designated as the LFA and is responsible for leading and coordinating all aspects of the Federal emergency response for fixed facilities or activities licensed by the NRC or an Agreement State, as well as transportation of nuclear material licensed by the NRC or Agreement States.

For the most part, the identified external constraints were found to be descriptive (i.e., outcome- or performance-oriented) rather than prescriptive (i.e., they do not specify specific process steps). Therefore, the constraints identify *what* incident response functions the NRC is responsible for, but do not describe *how* the NRC is to fulfill those responsibilities.

The constraints identified were reviewed in relationship to determining critical response activities and assessing whether constraints (i.e., documents) might need to be revised as a necessary step to implement identified initiatives.

4.0 INCIDENT RESPONSE FUNCTIONS

This section provides the team's SA findings in the areas of response functions and activities for power reactor incidents (Section 4.1), FCF incidents (Section 4.2), and nuclear material incidents (Section 4.3). For each of these areas, respectively, Sections 4.1, 4.2, and 4.3 provide the SA team's findings with respect to the following considerations: (1) the effectiveness review, (2) the efficiency review, (3) the development of alternatives that meet the team-established response function goals and objectives, (4) an assessment of potential alternatives to identify potential increases in effectiveness and/or efficiency, and (5) recommendations.

4.1 Nuclear Power Plant Incident Response Function

This section describes the team's assessment of the response process for incidents involving nuclear power reactors. The methodology for this assessment included effectiveness and efficiency reviews, development and analysis of response options, cost benefit analysis, and identification of initiatives, as described in Sections 4.1.1 – 4.1.8.

4.1.1 Effectiveness Review

During the SA, the team conducted an effectiveness review for all significant response activities associated with current power plant incident response functions. The purpose of the review was to identify response activities that were critical to achieving the response-related goals and objectives identified by the team and described in Section 3.1 (i.e., "critical activities"). Activities identified as "noncritical activities" can be viewed as potential candidates for elimination.

The first step of the effectiveness review was to gather together information describing all of the current activities that are involved in the NRC receiving a report of an incident, making a response decision, and activating (i.e., implementing) the Federal response. The team identified these activities on the basis of a review of the current response procedures and interviews with the Incident Response Program office staff. An activity was considered "critical" if the team reached a consensus view that not performing the activity would result in ineffective performance and failure to meet one or more of the incident response goals or objectives identified in Section 3.1.

The team then identified the critical activities performed during a response to a nuclear power plant incident. As the basis for this identification, the team reviewed all the activities specified in the NRC's current response coordination manual (RCM), Section Q, "Concept of Operations with Organization Charts – NRC Incident Response Program." This included all of the activities performed by personnel at NRC HQ, the regional office, and the site in each response mode. In addition, the team reviewed all current NRC commitments and conducted informal interviews with experienced responders.

As a result of this review, the SA team determined that the current organization adequately addresses critical activities for technical assessments, interface with the facility, public affairs, and coordination with DOE radiological monitoring assistance. However, the review identified several additional critical activities that involve liaison with other Federal agencies which respond during a major incident. This included liaisons with the FEMA HQ emergency support team (EST), the FBI HQ and onscene response, and the EPA onscene coordinator (OSC).

With only a few exceptions, all HQ activities performed during standby and initial activation modes were identified as critical. All activities performed by the regional base team during standby mode were also considered critical. All of the activities performed by the initial site team that are identified as “critical positions”[8] were confirmed as critical, as were three additional activities involving interfaces with advanced elements of the FBI, EPA, and FEMA responses. These advanced elements are expected to be rapidly deployed in response to a criminal activity, hazardous material release, or major event possibly warranting a Presidential disaster declaration.

The critical activities identified by the SA team were catalogued into the following 15 categories:

1. Receive event notification
2. Make response decision
3. Activate response
4. Support response
5. Assess reactor
6. Assess radiological conditions
7. Assess safeguards
8. Direct response
9. Keep others informed
10. Support media
11. Coordinate deployment of Federal response to the scene
12. Provide liaisons with Federal activities in HQ area
13. Coordinate and direct on-scene Federal response
14. Observe licensee response actions
15. Coordinate with State and local officials

In these 15 response categories, the team identified 92 critical activities.

As noted above, the effectiveness review concluded that only a few of the current HQ organization activities were noncritical. Noncritical activities included selected highly specialized technical activities (e.g., detailed instrumentation and control system analysis). Individuals for such specialized technical activities were not considered critical team members early in an event because the in-depth information needed to perform a detailed analysis requiring these specialists would generally not yet be available. The initial phase of an event analysis will be general in nature and associated with areas such as accident progression and radiological consequences identified as critical. The team concluded that experts could be called in, if needed, once the nature of the incident was understood.

[8] Response Coordination Manual, Section Q

The critical activities identified during the different modes of response to a power reactor incident were found to closely agree with the activities described in Section Q of the RCM for the current concept of operations.

4.1.2 Efficiency Review

The SA team also conducted a review to identify where current reactor response processes might be improved from an efficiency standpoint (e.g., cost, quality, timeliness, reliability). Therefore, the team assessed whether power reactor response functions "were being done the right way," or whether there were opportunities to perform these functions more efficiently. The efficiency review considered the critical activities performed by HQ teams, the regional base team, and the initial site team as identified in Section 4.1.1 above.

During the SA, HQ incident response staff, regional ERCs, HQ office directors, and RAs were contacted to discuss current response processes and supporting readiness activities to obtain insights on the costs, quality, timeliness, and reliability of current response processes. In addition, the SA team examined source documents for the concept of operations of nuclear power plant incident response, together with documented program lessons learned. The SA team also observed the June 1998 Cooper exercise from the perspective of the HOC to obtain additional direct observations. Additionally, the SA team held a public meeting on June 16, 1998, to obtain the views of external stakeholders, including the nuclear industry, other Federal agencies and States. Issues discussed addressed the quality, cost, and timeliness of the current respect to incident response functions and readiness activities. To complete this portion of the review, the SA team examined budget information describing the resources currently expended by HQ and the regions to support response readiness. In particular, the evaluated activities included responder training, participation in exercises, Federal coordination, and maintenance of the incident response infrastructure (such as NRC-wide response facilities and equipment). Unbudgeted resources for training, exercises, and response to actual incidents were also considered.

Overall, the SA team concluded that the current approach for nuclear power plant incident response supports the program goals and objectives identified in Section 3.1. Nevertheless, the team identified a number of cost, quality, timeliness, and reliability issues as discussed in the following paragraphs.

<u>Cost Considerations</u>

Readiness practices for the current concept of operations for power reactor incident response involve the expenditure of significant HQ and regional resources to maintain the quality, timeliness, and reliability of the NRC's response. These resources are tabulated in Table 4.1-1. During initial activation (i.e., the most resource-intensive mode for exercises or for an actual incident), relatively large site, regional base, and HOC teams are utilized. Depending on the region involved, the average initial site team varies from 15 to 25 members, with a minimum of 10 to 15 members. The maximum regional base team varies from as few as 6 members (Region IV) to as many as 15 (Region I). The full HOC team averages about 62. The SA team was informed that team sizes have grown over time in response to lessons learned from exercises and events. In principle, inter-team work processes do not involve duplication of efforts by team members on critical activities. However, in practice, the team found that some degree of overlap can occur between response teams (e.g., reactor assessment).

Table 4.1-1 Resources Expended by the Current Practices Within the Current Concept of Operations - Power Reactors

Aspect	Region I	Region II	Region III	Region IV	HQ
Initial Site Team Size Average (Minimum)	25 (13)	15 (10)	20 (15)	15 (13)	N/A
Base Team Size (Max-Min)	15 - 12	9 - 7	11 - 9	6 - 5	N/A
HQ Team Size	N/A	N/A	N/A	N/A	62
Roster Size	117	90	140	84	275
Bench Strength (Minimum Depth)	3	3	3	3	3
Full Drills Each Year	2 > 1	4	2	2	4
Period for Full Drills at a Site (Years)	9 > 19	5	4 -11	5-7	N/A
Training+Drills (FTE)	1.8	2.3	1.2	1.3	1.6
ERCs (FTE)	1.25	1.25	1.25	1.25	N/A
Response Center	Yes	Yes	Yes	Yes	Yes

Regional responder call lists (rosters) average about 108 staff members with a goal of 3 individuals for each position. Each region maintains a base team and an initial site team response capability and capacity which is independent of the other regions. In HQ, the power reactor responder call list involves about 275 individuals, and also has a goal of 3 individuals for each position. NRC-wide, over 600 responders are on these call lists.

During FY 1998, Region III and Region IV scheduled[9] two regional full-participation exercises while Region II scheduled four regional full-participation exercises. For FY 1998, Region I

[9] The Incident Response Program office has established goals and output metrics for HQ and regional exercise participation which can result in a significant variation in the number of full-participation exercises from region to region. The regional offices are requested to propose licensee exercises for HQ and regional participation inconsideration of the established goals. The regional offices have flexibility in establishing the level of exercise participation provided at least one full scale exercise is conducted annually with HQ. See Section 5.2 for additional information.

reduced its commitment from two full-participation exercises to one, in order to reduce unbudgeted resource expenditures for incident response activities. As noted in Section 2.3, about 8.1 FTEs are expended for regional and HQ office responder training and exercises although these resources are not budgeted. Accordingly, the regions and HQ offices (with the exception of NMSS and OSP) absorb response readiness resource expenditures in other budgeted programs. For the current team sizes and concept of operations, the aggregate time spent by NRC responders in response readiness activities results in a significant loss of staff time from other programs (e.g., inspection) and thereby some reduction in management support for response readiness activities.

Quality Considerations

The lack of specifically budgeted resources for response readiness in the regions and most HQ offices hinders the ability of HQ or regional office management to fully support the responder training and exercises called for in Management Directive (MD) 8.2, "Incident Response Program," dated August 18, 1996, and specified in the current incident response training plan. Accordingly, regional and HQ responders do not always meet established responder training periodicity standards and expectations. As a result, regional management frequently substitutes exercise participation for formal responder training courses as a means of maintaining response position technical knowledge and skills. Response coordinators coach responders during exercises as a training technique. However, response coordinators occasionally spend elevated time and effort coaching responders in the proper performance of their response duties to compensate for weaknesses in responder knowledge of their response duties.

Lessons learned from completed exercises also indicate that exercises may impart negative training in some cases. Exercises have not generally simulated the intense public communications demands that would face NRC spokespersons (e.g., Chairman, DSO) during an actual incident. They also have not generally simulated the challenge that HQ and initial site team reactor safety specialists might experience to assess reactor degradation and licensee mitigation actions. In addition, there is some anecdotal information from the Incident Response Program staff that smaller response teams have been observed to perform as well as or better than larger response teams. Finally, industry feedback from the public meeting on June 16, 1998, indicates that information requests made by NRC responders during exercises have distracted the focus and resources of the licensees' responders away from accident analysis and mitigation activities. The aforementioned quality/performance issues are well-recognized by Incident Response Program management and staff, and actions are being taken in a number of areas to resolve concerns.

Timeliness Considerations

From the standpoint of timeliness, an initial site team dispatched from the affected regional office provides the earliest site arrival time in most cases. However, arrival of an initial site team in advance of a postulated early radiological release caused by an early containment failure accident sequence (low probability) would generally not be possible. Consequently, critical response activities are performed by the HOC with the support of the regional base team at the IRC during the first few hours. The emergency response data system (ERDS) and emergency telecommunications system (ETS) provides critical information links from the plant site to the regional and HQ response centers to allow timely support for NRC reactor assessments and PARs as well as other LFA responsibilities.

<u>Reliability Considerations</u>

HQ responder callout experience for actual and simulated incidents indicates occasional difficulties or delays in filling all required response positions as a result of responder unavailability or telecommunications difficulties. These issues compound the aforementioned staff resource burdens that are imposed by the current staffing practice and concept of operations. As a result, the IRD staff recently conducted a preliminary staffing/position analysis of the HOC teams to evaluate smaller staffing requirements.

<u>Conclusion</u>

As a result of the above efficiency considerations, the SA team concluded that opportunities might exist for improving cost efficiency at two levels. First, there may be a potential to reduce staffing levels needed to carry out the critical activities that are performed at the HOC, as well as at the regional base and the initial site teams. Also, the team concluded that alternative response approaches (i.e., alternative concepts of operations) might allow sustained or even improved response performance but with a reduced aggregate pool of NRC-wide resources.

Initiative: The regional offices and those HQ offices that provide significant professional, technical, or administrative resources for incident response activities (i.e., incident response training, exercises, response to actual incidents), should have resources (FTE) explicitly allocated, at the appropriate levels, to support response activities.

4.1.3 Incident Response Options

In view of the above efficiency insights, the SA team identified six incident response options (i.e., combinations of staffing and concepts of operations) as shown in Table 4.1-2.

The first option describes the *current practice* in terms of team staffing levels and the current concept of operations. In the current concept of operations, the region has the lead in normal mode and HQ supports the regional lead. HQ assumes the lead in standby mode with the region supporting HQ. The region’s primary focus in this mode is to prepare to dispatch a team of responders to the site of the incident. During initial activation mode, HQ continues the lead, with the regional base team supporting HQ. During initial activation, the region dispatches a formal initial site team and is en route to the site. In expanded activation mode, when the regional initial site team arrives at the site and is formally authorized, the lead for the NRC response is transferred from HQ to the regional initial site team. HQ and the regional base team support the initial site team in expanded activation mode. In full Federal activation, additional responders would supplement the initial site team to ensure that all liaisons are in place to coordinate with other Federal agencies responding to the scene of the incident. During each mode for this option, the HQ response organization in the HOC, the regional base team

Table 4.1-2 Alternative Incident Response Concepts - Power Reactors

		INCIDENT RESPONSE MODE				
#	**Option Description**	**Monitoring Phase of Normal**	**Standby**	**Initial Activation**	**Expanded Activation**	**Full Federal Activation**
1	HQ Lead in Standby* Regional Site Team Current Practice	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead*	Reg BT Support	Reg BT Support	Reg BT Support	Reg BT Support
				Reg ST Depart	Reg ST Lead	Full ST Lead
2	HQ Lead in Standby Regional Site Team Minimum Teams	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead	Reg BT Support	Reg BT Support	Reg BT Support	Reg BT Support
				Reg ST Depart	Reg ST Lead	Full ST Lead
3	HQ Lead in Standby HQ Site Team Minimum Teams	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead	Reg BT Support	Reg BT Support	Reg BT Support	Reg BT Support
				HQ ST Depart	HQ ST Lead	Full ST Lead
4	Region Lead in Standby Regional Site Team Minimum Teams	HQ Support	HQ Support	HQ Support	HQ Support	HQ Support
		Reg BT Lead	Reg BT Lead	Reg BT Lead	Reg BT Support	Reg BT Support
				Reg ST Depart	Reg ST Lead	Full ST Lead
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	HQ Support	HQ Support	HQ Support	HQ Support	HQ Support
		Reg BT Lead	Reg BT Lead	Reg BT Lead	Reg BT Support	Reg BT Support
				NRC ST Depart	NRC ST Lead	Full ST Lead
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead	Reg BT Support	Reg BT Support	Reg BT Support	Reg BT Support
				NRC ST Depart	NRC ST Lead	Full ST Lead

* HQ has the lead in Standby *and* Initial Activation; It is assumed that for all options the region has the lead in the monitoring phase of normal mode with HQ supporting the regional lead.

**Shaded boxes indicate the lead team for the mode (e.g., the regional base team has the lead in "Monitoring Phase of Normal Mode" for all options)

and the regional initial site team are each composed of responders, the number of which corresponds to the current practice.

The second option is identical to the first option except that, during each mode, the HQ response organization in the HOC, the regional base team and the regional initial site team are each composed of responders, the number of which corresponds to the *minimum team staffing* needed to carry out critical response activities. (See Section 4.1.1.)

The third option is identical to the second option (i.e., minimum team staffing) except that the concept of operations is changed so that, during initial activation, HQ dispatches the *initial site team* (instead of the region), which is composed of HQ responders. The HQ initial site team assumes the lead for the NRC response in expanded activation mode.

The fourth option is identical to the staffing and concept of operations in the second option except that *the region has the lead during standby and initial activation,* with HQ supporting the regional base team. The regional base team composition and staffing is expanded to handle the additional responsibilities and, staffing at the HOC is decreased.

The fifth option is identical to the fourth option except that an *intra-NRC initial site team*, composed of a core of regional responders supplemented by responders from HQ and the other regions, is dispatched to the site during initial activation mode. During standby mode, the initial site team is activated and dispatched by HQ (similar to an incident investigation team (IIT). During initial activation, the regional office dispatches the core of regional responders on the intra-NRC initial site team, while HQ ensures dispatch of responders who fill the non-core positions on the intra-NRC initial site team. Further discussion of the composition and source of responders for the intra-NRC initial site team is provided in later sections. In expanded activation mode, the intra-NRC initial site team assumes the lead for the NRC response.

The sixth option is identical to the second option except that an *intra-NRC initial site team*, composed of a core of regional responders supplemented by responders from HQ and the other regions, is dispatched to the site during initial activation mode. During standby mode, the initial site team is organized by HQ (similar to an IIT). During initial activation, HQ dispatches the intra-NRC initial site team. In expanded activation mode, the intra-NRC initial site team assumes the lead for the NRC response.

The above options for concepts of operations represent all significant variations in HQ and regional lead responsibilities for standby and initial activation modes and dispatching an initial site team. The option of HQ in the lead during normal mode was not explicitly considered in order to reduce the number of variations. HQ in the lead for normal mode was not viewed as a significant variation, since it may be implemented within the boundaries and analysis basis of any of the six options that might ultimately be selected. The last two options are intended to consider for analysis the additional efficiencies that are possible by composing initial site teams from a single NRC roster of qualified site responders. Each option will have associated costs, as well as advantages and disadvantages with respect to quality, timeliness, and reliability toward achieving the incident response goals and objectives.

4.1.4 Analysis of Incident Response Options

This section presents the SA team's analysis of each of the response options presented in Section 4.1.3 in terms of their estimated costs and projected benefits from the standpoint of quality, timeliness, and reliability. Each option was first analyzed on a qualitative basis to develop a more detailed description of the response concept. Each option was then analyzed on a quantitative basis for cost and timeliness. Quality (i.e., projected performance) insights for each option were developed on the basis of a Delphi approach incorporating the views of a panel of incident response “experts” from the regional and HQ offices. Reliability issues were identified on the basis of the comments of the expert panel and analysis by the SA team.

Qualitative Analysis of Incident Response Options

The SA team reviewed current reactor incident response procedures and determined the assignment of functions and critical activities that would be performed by HQ teams and the regional base team responders for Options 2 – 6. Each of the six options involves a variation of two basic concepts or approaches.

The first option retains the *current practice* of having HQ in the lead in standby and initial activation modes, with the regional base team supporting HQ in both modes. This approach is used for the existing concept of operations and Options 1, 2, 3, and 6. The second approach places the regional base team in the lead in standby and initial activation modes, with HQ supporting the regional base team in both modes. This approach reverses the lead and support responsibilities of the region and HQ (compared to the first approach) and is the basis for Options 4 and 5. For both approaches, critical activities were apportioned to give the maximum logical responsibilities to the lead organization (i.e., HQ or the region). However, it was assumed some critical activities would still need to be carried out by the supporting organization. For example, it was assumed that support for the Chairman and liaison with the HQ staffs of other Federal agencies would always reside with HQ in the HOC, regardless of the regional offices taking the lead in Options 4 and 5.

The variations within the two basic approaches involve the source and composition of the initial site team. The variations for the initial site team source/composition are (1) an initial site team dispatched from the region (as in the current concept of operations), (2) an initial site team composed of responders dispatched from HQ, and (3) an initial site team composed of a core group of responders dispatched from the region, supplemented by responders from HQ and the other regional offices (i.e., an intra-NRC initial site team).

When the variations of the two basic approaches are taken together, the options span a spectrum of alternatives between assigning maximum responsibility to the affected region at one end of the spectrum and assigning maximum responsibility to HQ at the other end. For each mode and each option, the SA team then developed the critical activities that would be accomplished by the lead and support organizations (i.e., HQ and regional offices).

HQ in the Lead in Standby and Initial Activation

The following paragraphs describe the assumed apportionment of critical response activities when it is assumed that HQ is in the lead in standby mode and initial activation mode and the regional base team supports HQ in these modes (Options 1, 2, 3 and 6).

- Headquarters Critical Activities:

  If HQ has the lead for the Federal response in standby or initial activation mode, it will assess the reactor facility and licensee responses to the event relying on the technical expertise of the responders at the HOC (e.g., AEOD, NRR, RES, and NMSS). HQ responders would also support the States by developing, with representatives from other Federal agencies, the Federal assessment of the potential radiological consequences and PARs for the public and emergency workers. HQ would interface with the White House, the Congress, the HQ responders from other Federal agencies and the national news media. In addition, HQ would support the Chairman as the NRC's ultimate decision-maker during the incident. HQ may also assemble, dispatch, and support an initial site team.

- Regional Base Team Critical Activities:

  When the regional base team is supporting HQ during standby and initial activation modes, its primary activities are in preparing, dispatching, and supporting the initial site team. The region will also provide the initial interface with State officials and regional level responders from other Federal agencies. The region may also provide information for the media in the region.

<u>Region in the Lead in Standby and Initial Activation</u>

The following paragraphs describe the assumed apportionment of response functions and critical response activities when it is assumed that the affected region is in the lead in standby and initial activation modes and HQ supports the region in these modes (Options 4 and 5).

- Headquarters Critical Activities:

  When HQ is in the support mode during standby and initial activation modes, it will support the regional assessment of reactor conditions (from the HOC) by providing severe accident management expertise available through responders from RES and NRR. The Chairman, at the HOC, would be the NRC's ultimate decision-maker during these modes. HQ will support the regional assessment of radiological conditions by providing and coordinating the assessments of the representatives of the EPA, the USDA, and the U.S. Department of Health and Human Services (DHHS) responding to the HOC. In addition, HQ will coordinate the deployment of Federal radiological monitoring to the site through the DOE liaison. Using information generated by the region, HQ would interface with the White House, the Congress, HQ of other Federal agencies, and the national news media. Depending on the option HQ may also assemble, dispatch, and support an initial site team.

- Regional Base Team Critical Activities:

  If the region has the lead for the Federal response in standby and initial activation, it would assess reactor conditions and the licensee's response with the support of HQ. The region would be responsible for developing the Federal information on the event for the media, the White House, and the Congress. The region would also support the State by developing the Federal assessment of the potential radiological consequences and protective actions for the public and emergency workers with support for HQ. (It may also assemble, dispatch, and support an initial site team.)

Initial Site Team

When the affected region dispatches the initial site team, it is assumed that all initial site team members would come from the regional office. When HQ dispatches the initial site team, it is assumed that all initial site team members would come from HQ. When the initial site team is composed of a core group of responders that is dispatched from the affected region that is supplemented by responders from HQ and the other regional offices (i.e., an intra-NRC initial site team), it is assumed that the affected regional core group will occupy the positions of DSO, reactor safety coordinator, protective measures coordinator, emergency response coordinator and government liaison coordinator. Composing and staffing the core group in this manner ensures that the initial site team members who are among the first to arrive on site occupy the most critical leadership, communications and coordination positions on the team, and involve individuals who are most knowledgeable of the facility-specific design and operations, and emergency response plan and local emergency response personnel.

Quantitative Analysis of Incident Response Options

Table 4.1-3 summarizes the quantitative estimates of the staffing required for each option. The staffing estimates do not include responders provided by other agencies. A quantitative analysis provides an estimate of the minimum staff that would be needed in each location (HQ team, regional base team, and initial site team) for each response mode of each option. Option 1 represents the staffing levels that are *currently* implemented for the *current* concept of operations. These staffing levels reflect the *actual* staffing used in practice by HQ and the regional offices for full-participation exercises. For Option 1, the range of staffing for each location and mode reflects the reported range of staffing for the HOC team, the regional base team and the initial site team.

Options 2 – 6 involve the *minimum* staffing levels that the SA team *estimated* would be required for each location and each mode for each of these five options to perform the critical activities associated with the apportionment of responsibilities applicable to the option. In estimating the minimum staffing for each location, the SA team made the following assumptions:

- The estimated minimum staff includes all of the critical positions expected to be needed within the first 24 hours and any others requiring specialized training.
- The other critical positions could be staffed during the response on an as-needed basis.
- The assigned personnel are sufficiently trained and qualified so that they do not rely on coaching on response duties and activities.
- Critical activities are performed in a single manner (no diversity).

Table 4.1-3 Required Staffing for Alternative Concepts of Operation by Response Mode - Power Reactors

Staffing for Alternative Concepts of Operation						
#	**Option Description**	**Monitor Phase of Normal**	**Standby**	**Initial Activation**	**Expanded Activation**	**Full Federal Activation**
1	HQ Lead in Standby Region Site Team Current Practice	HQ 0 BT 2-3 ST 0 **Total 2-3**	HQ 60-65 BT 5-15 ST 0 **Total 65-80**	HQ 60-65 BT 5-15 ST 10-20 **Total 75-100**	HQ 60-65 BT 5-15 ST 10-20 **Total 75-100**	N/A
2	HQ Lead in Standby Regional Site Team Minimum Teams	HQ 0 BT 2-3 ST 0 **Total 2-3**	HQ 18 BT 7 ST 0 **Total 25**	HQ 34 BT 3 ST 14 **Total 51**	HQ 25 BT 3 ST 14 **Total 42**	N/A
3	HQ Lead in Standby HQ Site Team Minimum Teams	HQ 0 BT 2-3 ST 0 **Total 2-3**	HQ 18 BT 4 ST 0 **Total 22**	HQ 34 BT 3 ST 14 **Total 51**	HQ 25 BT 3 ST 14 **Total 42**	N/A
4	Region Lead in Standby Region Site Team Minimum Teams	HQ 0 BT 2-3 ST 0 **Total 2-3**	HQ 16 BT 14 ST 0 **Total 30**	HQ 21 BT 21 ST 14 **Total 56**	HQ 20 BT 8 ST 14 **Total 42**	N/A
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	HQ 0 BT 2-3 ST 0 **Total 2-3**	HQ 16 BT 14 ST 0 **Total 30**	HQ 21 BT 21 ST 14 **Total 56**	HQ 20 BT 8 ST 14 **Total 42**	N/A
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	HQ 0 BT 2-3 ST 0 **Total 2-3**	HQ 18 BT 4 ST 0 **Total 22**	HQ 34 BT 3 ST 14 **Total 51**	HQ 25 BT 3 ST 14 **Total 42**	N/A

- Critical activities are performed by the minimum (necessary and sufficient) personnel that are needed (no intra-team redundancy).

- Critical activities are performed at one location in each response mode (no inter-team redundancy).

The SA team also predicated the quantitative estimate for the minimum staffing requirements for each location and mode on a ”worst-case” event (from a staffing perspective). This worst-case involves radiological, chemical, and criminal aspects. For Options 2 – 6, the SA team developed the detailed basis for the estimated minimum staffing needed to perform all of the critical activities in the three locations during standby, initial activation, and expanded activation modes.

Initial activation mode results in the maximum staffing burden for any of the options. As seen from Table 4.1-3, the estimated number of HQ responders that would be required during initial activation mode is substantially lower for Options 2 (i.e., 34) than is required for Option 1 (i.e., 60 to 65) which is the current practice. This reduction primarily results from streamlining the management structure of each functional team at HQ. For example, the HQ ET was replaced by a single decision-maker (typically the Chairman) and functional team deputy directors were eliminated. The HOC team directors provide advice and assistance to the single decision-maker rather than the ET members. The team discussed the estimated HQ staffing for Option 2 with the IRD staff, which had independently developed an estimated minimum HQ team staffing for initial activation prompted by staffing reliability considerations described in Section 4.1.2. The team's estimate of the minimum HQ staffing needed during initial activation mode was found to be virtually identical to the Incident Response Program office staff estimates. Therefore, although there are uncertainty and differences in views on the *best* estimate for the minimum HQ staffing levels, the team did obtain good agreement between the SA team results (based on the team' rationale and approach for estimating the minimum staffing levels) and the results developed independently by the staff.

For Option 2, the estimated minimum staffing levels for the regional base team and initial site team were very close to the number of critical positions shown in the RCM. The differences reflect the elimination of the health physics network (HPN) and emergency notification system (ENS) communicators on the initial site team and the addition of staff to interface with advanced elements of other Federal agencies responding to the event. Comparing the current practice shown in Table 4.1-1 with the estimated minimum shown in Table 4.1-3, it is seen that the minimum estimated initial site team staffing (i.e., 14) is slightly *higher* than the minimum staffing used and reported by three of the four regions. The remaining region reported using one additional responder (i.e., 15) as a minimum on the initial site team. However, the estimated minimum initial site team is smaller than the *average* size initial site team used by the regions during exercises. That is, the regions typically deploy larger initial site teams than called for in the RCM or the team's estimated minimums. The minimum estimated regional base team (i.e., 3) is the same as the minimum reported and used by one region, but much lower than that reported by the other three regions. The staffing estimates for Option 2 indicate that a substantial resource (cost) reduction may be available by streamlining the HQ response organization and by having the regional base and initial site team sizes conform to the staffing guidance in the RCM.

The team also developed estimates using the same assumptions for Options 3 – 6. As shown in Table 4.1-3, the minimum initial site team size is independent of the option (i.e., independent of the source of the initial site team). The estimated minimum regional base team is considerably larger (i.e., 21 versus 3) when the regional base team has the lead in standby and initial activation modes (i.e., Options 4 and 5). However, for these options the estimated minimum HQ team does not fall below 21 because of the selected responsibilities, which are assumed to be continued even if the region has the lead in standby and initial activation modes. Overall, for Options 2 – 6, the total NRC-wide estimated minimum number of responders during initial activation is seen to vary between 51 and 56 (compared to 75 to 100 in the current practice).

4.1.5 NRC-Wide Required Rosters for Incident Response Options

Table 4.1-4 presents the estimated NRC-wide responder roster sizes that would be required for each option. The estimates assume that rosters are three deep for each position (except as noted below), and each region must independently support its own regional base team and initial site team responsibilities when the regional base team has the lead in standby and initial activation and when the region dispatches the initial site team, respectively. The converse is assumed to be true when HQ has the lead in standby and initial activation and HQ dispatches the initial site team.

For options involving an intra-NRC initial site team, the SA team assumed that the initial site team is composed of a core group of responders dispatched from the affected region, supplemented by responders dispatched from HQ and the other regional offices. As discussed in Section 4.1.4, when the initial site team is composed of a core of responders from the affected region, supplemented by responders from HQ and the other regional offices (i.e., an intra-NRC initial site team), it is assumed that the regional core group will occupy five of the fourteen positions on the initial site team. These positions are the DSO, reactor safety coordinator, protective measures coordinator, emergency response coordinator and government liaison coordinator. The required roster size for the cases involving an intra-NRC initial site team (i.e., Options 5 and 6) reflects the assumption that each of the four regions would need to maintain a roster three deep only for its qualified core group, while it is assumed that HQ would need to maintain a roster for the remaining nine (non-core) positions on the initial site team. The latter roster, for the non-core initial site team members, is assumed to be *four* deep in each of the nine positions. With the non-core roster four deep, if it is further assumed that there is one intra-NRC initial site team exercise in each region each year and responders on the non-core roster would participate in one (and only one) intra-NRC initial site team exercise each year. That is, if the roster for the non-core members of the Intra-NRC initial site team were only three deep, nine responders on the roster would have to support two intra-NRC initial site teams each year. The SA team considered the support of two exercises each year excessive for maintaining response proficiency. It is assumed that the roster for non-core positions on the intra-NRC initial site team would draw from the most highly qualified responders across the NRC (i.e., from any region or HQ).

4.1.6 Cost-Benefit Analysis for Incident Response Options

The SA team conducted a rough scoping analysis to estimate the projected efficiency and effectiveness of the various response options. For each option, the team developed an estimate for (1) the relative annual costs to maintain readiness in FTE, (2) the quality of response and responder performance, (3) initial site team response time in hours, and (4) reliability of the incident response options. In addition, the team compared each option to the current practice. The transition costs to revise program documents or to implement a change in the program were not included in the cost assessment. This could be a significant additional cost. The following paragraphs provide the results of these assessments.

Table 4.1-4 NRC-Wide Roster Sizes Required for Alternative Concepts of Operation - Power Reactors

NRC-Wide Roster Sizes						
#	**Option Description**	**Bench Strength**	**No of Regions or HQ**	**Initial Activation Team Sizes**	**Team Roster Size**	**NRC-Wide Roster Size**
		A	B	C	A*B*C	∑A*B*C
1	HQ Lead in Standby Region Site Team Current Practice	HQ = 3 BT = 3 ST = 3	HQ 1 BT 4 ST 4	HQ 60-65 BT 5-15 ST 10-20	HQ 180-195 BT 60-180 ST 120-240	360 (to 615)[*]
2	HQ Lead in Standby Regional Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 4 ST 4	HQ 34 BT 3 ST 14	HQ 102 BT 36 ST 168	306 (to 383)[**]
3	HQ Lead in Standby HQ Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 4 ST 1	HQ 34 BT 3 ST 14	HQ 102 BT 36 ST 42	180 (to 225)[**]
4	Region Lead in Standby Regional Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 4 ST 4	HQ 21 BT 21 ST 14	HQ 63 BT 252 ST 168	483 (to 604)[**]
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	HQ = 3 BT = 3 $ST_c^{\#}$ = 3 $ST_{nc}^{\#\#}$ = 4[†]	HQ 1 BT 4 ST_c 4 ST_{nc} 1	HQ 21 BT 21 ST_c 5 ST_{nc} 9	HQ 63 BT 252 ST_c 60 ST_{nc} 36	411 (to 514)[**]
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	HQ = 3 BT = 3 ST_c = 3 ST_{nc} = 4[†]	HQ 1 BT 4 ST_c 4 ST_{nc} 1	HQ 34 BT 3 ST_c 5 ST_{nc} 9	HQ 102 BT 36 ST_c 60 ST_{nc} 36	234 (to 293)[**]

[*] Consistent with the roster sizes in Table 4.1-1, the current actual NRC-wide roster size is 706. The difference results, in part, from the fact that some response positions involve actual bench strengths greater than 3 deep.
[**] Assumes 25 percent larger bench strength (or 25 percent larger team sizes)
[#] Regional core component of the Intra-NRC initial site team
[##] Non-core component of the Intra-NRC initial site team
† The initial site team rosters is assumed to be *four* deep for each non-core position. This ensures that non-core initial site team responders need not participate in more than one exercise each year (see Section 4.1.5 for additional discussion).

<u>Cost Considerations</u>

An assessment of the costs for each option was developed on the basis of the sum of the annual FTE costs for responder training and the annual FTE cost of responder participation in full-participation exercises. The estimated annual cost (in FTE) for training was developed for each option by scaling up (or down) the 3.0 FTE annual regional and HQ response training resource cost (see Section 2.3) by the ratio of the required NRC-wide minimum roster size for the selected option (see Table 4.1-4) to the required minimum NRC-wide roster size for Option 1, which is the current practice. As seen from the results shown in Table 4.1-5, reducing the team sizes to a minimum within the current concept of operations (Option 2) would save about 0.5 FTE in training costs NRC-wide. Options 3 and 6 are estimated to provide the greatest training cost savings. It is estimated that Option 3 would cut training costs in half from about 3.0 FTEs to about 1.5 FTEs, and Option 6 would cut training costs by a third from 3.0 FTEs to 2.0 FTEs. Option 4 results in the largest training costs and would be projected to increase responder training resource requirements from 3.0 FTEs to 4.0 FTEs.

Table 4.1-5 Estimated Annual Resource Requirements for Training for Alternative Concepts of Operation - Power Reactors

Estimated Annual Resources Required for Training				
#	Option Description	Minimum NRC-Wide Roster Size	Ratio of NRC- Wide Roster Sizes (Option n/Option 1)	Estimated Training Cost (FTE)
		A	B	B * 3.0 FTE
1	HQ Lead in Standby Region Site Team Current Practice	360	1.00	3.0
2	HQ Lead in Standby Region Site Team Minimum Teams	306	0.85	2.5
3	HQ Lead in Standby HQ Site Team Minimum Teams	180	0.50	1.5
4	Region Lead in Standby Region Site Team Minimum Teams	483	1.34	4.0
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	411	1.14	3.4
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	234	0.65	2.0

The SA team also estimated the annual cost (required FTE) for full-participation exercises for each option on the assumption that moderate to large teams that have lead responsibility during standby and initial activation or expanded activation modes (e.g., the initial site team) would generally participate in full-participation exercises at least twice each year in order to maintain proficiency. Small teams could exercise every other year in an exercise environment to maintain proficiency. However, for Options 5 and 6 (i.e., involving an intra-NRC initial site team) it was assumed that there would be one reactor exercise in each region each year. This was assumed

Table 4.1-6 Estimated Total Number of Responder-Exercises[*] for Alternative Concepts of Operation - Power Reactors

Estimated Total Number of Responder-Exercises						
#	**Option Description**	**Number of Exercises per Team per Year**	**Number of Regions or HQ**	**Initial Activation Team Sizes**	**Number of Responder-Exercises for Each Team per Year**	**Total Number of Responder-Exercises per Year**
		A	B	C	A*B*C	∑A*B*C
1	HQ Lead in Standby Region Site Team Current Practice	HQ = 4 BT = 2 ST = 2	HQ 1 BT 4 ST 4	HQ 60-65 BT 5-15 ST 10-20	HQ 240-260 BT 40-120 ST 80-160	360 to 540
2	HQ Lead in Standby Region Site Team Minimum Teams	HQ = 4 BT = 2 ST = 2	HQ 1 BT 4 ST 4	HQ 34 BT 3 ST 14	HQ 136 BT 24 ST 112	272 (to 340)[**]
3	HQ Lead in Standby HQ Site Team Minimum Teams	HQ = 2 BT = ½ ST = 2	HQ 1 BT 4 ST 1	HQ 34 BT 3 ST 14	HQ 68 BT 6 ST 28	102 (to 128)[**]
4	Region Lead in Standby Region Site Team Minimum Teams	HQ = 4 BT = 2 ST = 2	HQ 1 BT 4 ST 4	HQ 21 BT 21 ST 14	HQ 84 BT 168 ST 112	364 (to 455)[**]
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	HQ = 4 BT = 1 ST = 1	HQ 1 BT 4 ST 4	HQ 21 BT 21 ST 14	HQ 84 BT 84 ST 56	224 (to 280)[**]
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	HQ = 4 BT = 1 ST = 1	HQ 1 BT 4 ST 4	HQ 34 BT 3 ST 14	HQ 136 BT 12 ST 56	204 (to 255)[**]

[*] One responder-exercise equals 1 responder participating in 1 full exercise.
[**] Assumes 25 percent larger team sizes.

in order to avoid the non-core responders on the intra-NRC initial site team roster supporting more than one exercise each year (which the SA team considered excessive) or having to double the size of the non-core roster to allow two full exercises to be conducted in each region each year to avoid non-core responders from having to have to support more than one intra-NRC initial site team exercise each year. Doubling the size of the intra-NRC initial site team non-core roster would increase overall training costs and would substantially negate any FTE cost advantages that might be associated with the intra-NRC initial site team concept.

The estimated cost (in FTE) for exercises for each option was based on scaling up (or down) the 5.1FTE annual regional and HQ exercise cost (see Section 2.3) by the ratio of the total number of responder-exercises per year for the option to the total number of responder-exercises per year for the current practice (see Table 4.1-6). One responder-exercise equals one responder participating in one full exercise. The results are shown in Table 4.1-7. As seen from Table 4.1-7, reducing the team size to the minimum within the current concept of operations (Option 2)

Table 4.1-7 Estimated Annual Resource Requirements for Exercises for Alternative Concepts of Operation - Power Reactors

Estimated Annual Resources Required for Exercises				
#	Option Description	Total Number of Responder-Exercises per Year	Ratio of Responder-Exercises per Year (Opt n to Opt 1)	Estimated Exercise FTE for Option
		A	B	B * 5.1 FTE
1	HQ Lead in Standby Region Site Team Current Practice	360	1.00	5.1
2	HQ Lead in Standby Region Site Team Minimum Teams	272	0.76	3.9
3	HQ Lead in Standby HQ Site Team Minimum Teams	102	0.28	1.4
4	Region Lead in Standby Region Site Team Minimum Teams	364	1.01	5.1
5	Region Lead in Standby NRC Site Team Minimum Teams	224	0.62	3.2
6	HQ Lead in Standby NRC Site Team Minimum Teams	204	0.56	2.9

saves about 1.2 FTEs in exercise costs NRC-wide. Options 3 and 6 provide the greatest exercise cost savings and are estimated to cut the exercise costs from about 5.1 FTEs to about 1.4 FTEs and 2.9 FTEs for Options 3 and 6, respectively. It is estimated that Options 4 would result in no projected increase or decrease in exercise costs and Option 5 would lower costs to about 3.2 FTEs.

The estimated annual combined training and exercise costs for each option is shown in Table 4.1-8. As seen from Table 4.1-8, reducing the team size to the minimum within the current concept of operations (Option 2) would be estimated to save about 1.7 FTEs NRC-wide in training and exercise costs. Options 3 and 6 are estimated to provide the greatest overall cost savings. Option 3 is estimated to cut responder training and exercise costs from 8.1 FTEs to about 2.9 FTEs and Option 6 is estimated to lower overall costs to about 4.9 FTEs, resulting in a savings of 3.2 FTEs. Finally, it is estimated that Option 5 would result in a savings of 1.5 FTEs while Option 4 would increase overall training and exercise costs by 1.0 FTE.

Table 4.1- 8 Estimated Annual Resource Requirements for Training and Exercises for Alternative Concepts of Operation - Power Reactors

Estimated Annual Resources Required for Training and Exercises				
#	**Option Description**	**Estimated Exercise Cost (FTE)**	**Estimated Training Cost (FTE)**	**Estimated Training and Exercise Cost (FTE)**
		A	B	A+B
1	HQ Lead in Standby Region Site Team Current Practice	5.1	3	8.1
2	HQ Lead in Standby Region Site Team Minimum Teams	3.9	2.5	6.4
3	HQ Lead in Standby HQ Site Team Minimum Teams	1.4	1.5	2.9
4	Region Lead in Standby Region Site Team Minimum Teams	5.1	4	9.1
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	3.2	3.4	6.6
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	2.9	2	4.9

<u>Quality Considerations</u>

The quality assessment regarding the alternative concepts of operation considered the statements contained in historical documents from 1979 and 1980. The team was uncertain of the current validity of these early assumptions. It was clear from a review of the historical documents, that the NRC should manage the response to the emergency as close to the accident scene as possible. Language contained in the legislative history for PL 96-295 gave quality reasons for why it was believed that regional personnel were best suited for certain functions, while HQ personnel were best qualified for other tasks. Specifically, the following statement was found.

> "Professionals at the regional office have more "hands-on" experience and, consequently, a better working knowledge of the reactors within their jurisdictions. However, individuals best suited to respond to unprecedented problems such as the ones, that occurred at Three Mile Island are the technical staff at NRC headquarters."

To assess the relative response quality (i.e., the performance of responders in the alternative response concepts) the team used an expert elicitation (i.e., "Delphi") approach. Six NRC incident response experts were requested to rate each alternative from the perspective of quality of response performance. The expert panel was composed of three regional experts and three experts from HQ. Two of the experts were current or former regional ERCs, one was a former manager of the HQ Incident Response Program (and current regional manager with extensive regional incident response experience), two are current managers in the IRD, and one is the senior response specialist on the IRD staff.

Starting with the insights of the historical record and building on discussions with knowledgeable staff, the SA team identified the following 12 quality factors upon which the panel of experts would rate the projected performance of responders within each of the alternative concepts of operations:

1. Knowledge of plant specifics (e.g., plant design, operation, management)

2. Knowledge of specific State and local response plans and decision makers

3. Knowledge of the Federal response under FRERP

4. Capability to perform severe accident and consequence analysis

5. Proficiency in use of technical tools and communication systems, including the ERDS, the response computer system (RCS), the response technical manual, (RTM), the radiological assessment system for consequence analysis (RASCAL), and the FRMAC

6. Capability to coordinate with the HQ and regional response of other Federal agencies

7. Capability of support for decision-makers to include Chairman, licensee, and offsite officials

8. Capability to be the Federal spokesperson with Congress, the White House, media, and other Federal agencies

9. Capability to exercise appropriate authority with other Federal agencies, licensee, and off-site officials

10. Capability to coordinate the Federal response during each phase of response

11. Capability and capacity to deploy a coordinated and functional initial site team

12. Capability to sustain long term operations

Each expert was requested to rate each factor for each option. The possible ratings were excellent (5), very good (4), good (3), fair (2) or poor (1). Panel members were requested to explain their rationale for any fair or poor ratings that they assigned. The results of the expert elicitation are shown in Table 4.1-9.

Timeliness Considerations

The SA team performed an assessment to estimate the time for the initial site team to respond to the site for each option. The analysis approach was the same as that used by the regions to determine their response times. The response time is the sum of a number of travel times. These consist of ground transportation travel time to an airport, flight time in the air, and ground transportation travel time to the site. From the time the decision is made to send an initial site team, it would take 1 to 2 hours for the team to reach the airport. It is then assumed that a commercial flight is boarding, and the team can get on board. Because of the uncertainties for rapid departure on commercial flights, most regions have arranged for charter services if a plane is available. Commercial flight times were computed on the basis of information available in the computer-based Federal travel directory. Charter service flying times were determined on the basis of discussions with charter service personnel and were faster, but in some cases more expensive. After the team's arrival at the closest airport, the time to reach the site was assumed to be the time to get a rental car and drive to the site. Given the above review, it was determined that travel from NRC HQ to *most* of the sites would take more time on the average than a response from the regional offices. Some remote regional sites like North Anna and Calvert Cliffs are closer to HQ and would result in shorter travel times for dispatching an initial site team from HQ. However, travel time from HQ to several of the West Coast sites would take 2 to 3 hours longer than for an initial site team dispatched from the region office. Response time survey results from regional emergency response coordinators (ERCs) are contained in Table 4.1-10.

Table 4.1- 9 Results of Expert Elicitation for Quality of Response Performance† for Alternative Concepts of Operation - Power Reactors

		Concept of Operations					
#	Quality Factor	1	2	3	4	5	6
1	Knowledge of plant specifics	4 5 5† 5 4 5	4 4 3 5 4 5	2 1 1 4 1 3	5 5 5 5 4 5	2 5 4 5 3 5	1 5 4 5 3 3
2	Knowledge of specific State/Local response plans and decision makers	4 4 4 5 3 5	4 4 4 5 3 5	2 1 1 5 3 3	5 5 5 5 4 5	2 5 4 2 4 5	1 4 4 5 3 3
3	Knowledge of the Federal response under FRERP	5 3 2 5 4 5	5 3 2 5 4 5	5 2 2 5 4 5	3 2 2 2 4 2	2 5 2 5 4 5	3 5 2 5 4 5
4	Capability to perform severe accident and consequence analysis	4 3 3 5 4 5	4 2 3 5 4 5	4 3 2 5 3 5	4 2 3 2 1 2	4 5 4 5 1 5	4 5 4 5 3 5
5	Technical tools & communication systems Proficiency (ERDS, RCS, RTM, RASCAL)	4 3 3 5 4 5	4 2 3 5 3 5	4 3 2 5 2 5	4 2 3 5 1 2	4 4 4 5 1 5	4 4 4 5 1 5
6	Capability to coordinate with the HQ and Regional response of other Fed Agencies	5 4 5 5 3 5	4 3 3 5 3 5	4 3 2 5 3 5	4 3 4 5 3 4	4 4 3 5 3 4	4 4 3 5 3 5
7	Capability to support decision makers (e.g., Chairman, licensee, and offsite officials)	5 4 4 5 4 5	4 3 3 5 4 5	4 3 3 5 3 5	4 2 4 2 2 3	3 5 4 2 2 3	3 5 4 5 3 5
8	Capability as Federal spokesperson with Congress, WH, media, other Fed Agencies	5 3 3 5 4 5	5 3 3 5 4 5	4 4 3 5 3 5	3 3 4 4 3 4	3 4 3 4 4 4	3 5 4 5 4 5
9	Capability to exercise authority with other Fed agencies, licensee and offsite officials	5 4 4 5 3 5	5 2 3 5 3 5	5 3 3 5 3 5	4 2 3 3 4 2	4 5 5 3 4 2	4 5 4 5 3 5
10	Capability to coordinate the Federal response during each phase of response	5 4 3 5 3 5	4 3 3 5 3 5	4 3 3 5 3 5	3 3 3 3 3 2	2 4 3 5 3 2	4 5 3 5 3 4
11	Capability and capacity to deploy a coordinated and functional initial site team	5 4 4 5 4 5	5 4 4 5 3 5	3 2 3 3 2 5	5 3 3 1 1 2	2 5 4 1 1 1	2 4 4 1 2 1
12	Capability to sustain long-term operations	4 2 3 5 4 5	4 5 4 5 4 3‘	3 5 4 3 2 3	3 1 2 1 1 3	2 2 2 1 2 3	2 5 4 1 2 3
	Total Number of 3, 4 or 5 (72 Max)	70	68	56	48	51	61
	Total Number of 1 or 2 (72 Max)	2	4	16	24	21	11

† Projected Performance (i.e., Quality) Ratings: Excellent - 5, Very Good - 4, Good - 3, Fair - 2, Poor - 1

Reliability Considerations

The options involving an intra-NRC initial site team, whose members are drawn from multiple offices and geographical locations, raise a number of significant reliability issues that would need to be resolved to ensure success. Currently, each region conducts a periodic check of the availability of responders to support a regional base team and initial site team in the event of an emergency. For an intra-NRC initial site team, a check of availability to ensure adequate

Table 4.1-10 Time for the Initial Site Team to Reach the Site for Alternative Concepts of Operation - Power Reactors

	Concept of Operations					
Factor	1*	2	3	4	5	6
Site Team Response Time (Hrs)	4-6	4-6	6-8**	4-6	6-8	6-8

* Reg I: Average 3-4 hrs; Maine Yankee 4-5 hrs,
Reg II: Average 3-4 hrs; North Anna and Turkey Point 4 hrs,
Reg III: Average 3-4 hrs; Monticello 6-7 hrs,
Reg IV: Average 4-6 hrs; WNP-2 6-7 hrs
** HQ: Average 6-8 hrs; 4 West Coast sites 8-10 hrs

response personnel for the team would be logistically more difficult. In all likelihood, HQ would need to develop and implement a system to periodically and reliably check the availability of non-core responders (HQ or regional responders outside the region in which the incident is postulated to occur) to respond as initial site team members in positions designated as not necessarily provided by the affected region. HQ would need to maintain an additional call list and would need to contact and notify non-core responders located in geographically diverse locations. A means to reliably dispatch the non-core responders with accurate travel directions and travel plans would also need to be developed and implemented. Commercial-off-the-shelf tools for efficiently monitoring availability, contacting staff, and providing travel instructions (e.g., voice message pagers) would likely need to be utilized. Responders who had to travel the farthest (e.g., from HQ to a plant in the Midwest) might delay the NRC from entering expanded activation mode if unforseen travel delays were to occur. Plans to dispatch additional responders from different geographic locations might be required in an *actual emergency* (not for exercises) to ensure that turnover of the lead for the NRC emergency response to the DSO is not delayed.

Table 4.1-11 Cost-Benefit Analysis Summary for Alternative Concepts of Operation - Power Reactors

		Concept of Operations					
	Efficiency Factor	**1**	**2**	**3**	**4**	**5**	**6**
1	Quality (# of 3, 4 or 5 Hits out of 72 Max)	70	68	56	48	42	61
2	Cost for Training and Exercises (FTE)	8.1	6.4	2.9	9.1	6.6	4.9
3	Time for Initial Site Team Response (Hrs)	4-6	4-6	6-8	4-6	6-8	6-8

Additionally, the smaller HOC, regional base and initial site team (including the intra-NRC initial site team) staffing, that is associated with minimum teams (i.e., Options 2 – 6), results in very limited “reserve capacity” within teams to perform critical response activities. Further, although the NRC-wide call list (roster) size would also be reduced by these options (which provides a cost savings), the reduction would also reduce the overall NRC-wide responder bench strength needed to sustain long-term operations. Finally, selected members of the expert panel were concerned (i.e., areas rated as fair or poor) that the staff members in the non-core portion of the initial site team would be significantly less familiar with the site, locale, resident staff, State and local officials and licensee personnel than the regional staff members in the core portion of the initial site team. However, since the non-core members would be drawn from rosters involving the most knowledgeable and most skilled responders (in their response positions) in the NRC, the potential existed for improving the overall reliability of performance of the initial site team.

4.1.7 Initiatives

Initiative: Implement a trial program to assess the acceptability of minimum teams (minimum staffing) within the current concept of operations (Option 2). On the basis of the trial program results, establish the minimum team approach on a permanent basis, as appropriate.

Initiative**:** If the increased initial site team response time is acceptable, develop and implement an evaluation program to fully assess the quality of performance, reliability, timeliness, etc. of alternative response concepts, such as HQ staff participation on the initial site team and minimum teams (e.g., Options 3 and 6). The evaluation should carefully assess all potentially significant performance and reliability issues identified by the SA team and panel of experts. On the basis of the results of the evaluation, establish the alternative response concept and minimum team approach on a permanent basis, as appropriate.

4.1.8 Other Incident Response Function Issues and Initiatives

<u>Incident Response Decision-Making Process</u>

The current process for deciding the level of NRC's response (decision-making process), as described in Section 2.1, is complex and time consuming. It may require the HOO to contact 10 or more individuals at a time when the HOO may be receiving other calls from the media and NRC staff. Each time another individual is added to the bridge, a briefing and discussion are generally repeated to inform the new individual of the event, related issues, and response. The decision-making process has expanded over time in an effort to resolve problems resulting from a lack of expertise or training and a lack sufficient authority of the EO and RDO to make final response decisions.

During the response to the alert at Davis-Besse on June 24, 1998, the HOO made, received, or transferred 36 phone calls in the 25 minutes between licensee notification and the decision to enter standby mode. During the recent alert at Washington Nuclear 2 (WNP-2) on June 17, 1998, the HOOs made about 30 phone transfers in the 40 minutes between the initial call and the decision to enter the monitoring phase of normal mode. The WNP-2 event response decision was also delayed by NRC staff members (who were not part of the decision-making process) who called the HOO for a briefing on the event.

Figure 4.1 shows a possible streamlined approach for response decision-making on the Federal response level. This streamlined approach combines the safeguards analysis, safety analysis, and decision-making steps. There would be a single decision-maker at HQ and in the region.

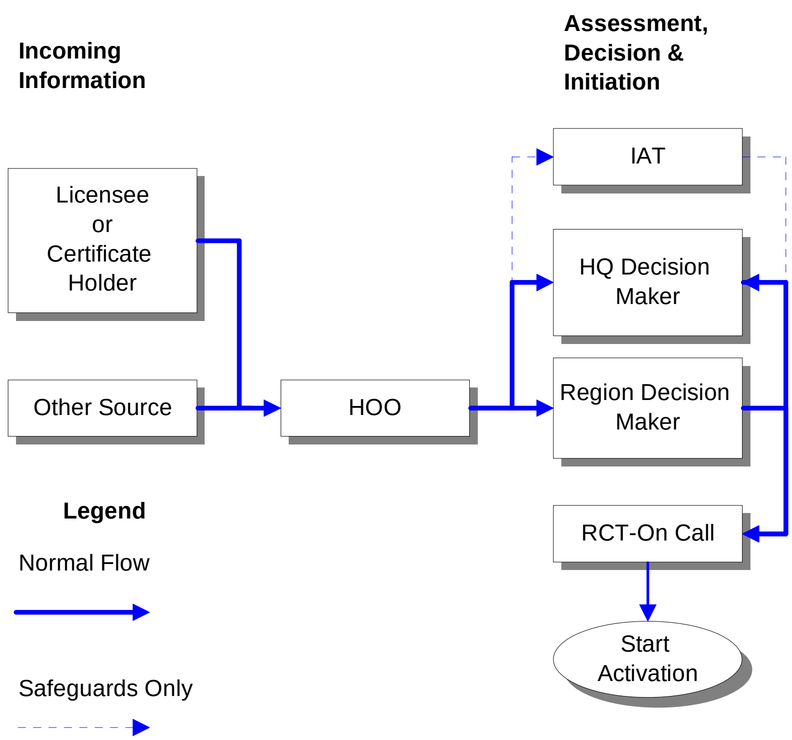

Figure 4.1 Alternative Response Decision-Making Process

This individual would be given the response decision-making authority and responsibility in concert with the development and implementation of appropriate decision criteria and training (qualification). The Incident Response Program member included on the conference call would have the authority and responsibility to provide advice on response protocols and to promptly initiate activation. The HOO would be given the responsibility and authority to screen out lesser events (as they do now) in concert with the development and implementation of appropriate screening criteria and qualification training.

The safety significance of potentially significant events requiring a response should be clear, and the streamlined approach would enable a more prompt activation. Events of questionable safety significance may require additional expertise and analysis to determine the appropriate level of response. In these cases, the NRC is placed in monitoring mode and a few experts are brought in to further analyze the event. Streamlining the decision-making process reduces the workload on the HOO during an event, speeds up the process, and keeps the focus on making the activation decision. The approach is consistent with the streamlined approach that nuclear power plant licensees were required to adopt following the TMI accident. Under these new requirements, the decision to classify the event, activate the site response, and notify offsite officials must be made promptly by someone in the control room without calling corporate or other management. This is critical since complex decision-making processes can result in excessive delays in activating the response.

In estimating the minimum staff for response decision-making, it was assumed that the affected region and HQ would be involved in the decision. This is because HQ and the region would provide staff to the response for all incident response options and must be knowledgeable of the event and NRC response in order to respond to outside inquiries.

Initiative: Streamline the response decision-making and activation processes for power reactor incidents to make them more timely and resource efficient.

Executive Team Composition and Organization

During initial activation, the ET is composed of the Executive Team Director, Deputy Director, and members. The ET Director (i.e., the Chairman or designated Commissioner) is responsible for all response activities throughout the emergency, and ensures that the NRC is effectively performing its LFA responsibilities. The role of the ET members is to provide advice and assistance to the Chairman in assessing and recommending NRC and licensee emergency response actions. ET members include the Executive Director for Operations (EDO), and the directors of the offices of NRR, NMSS and RES, and the Incident Response Program office. Historically, office directors were on the ET so that the authority for committing resources was immediately available. Since ET members tend to have similar nuclear safety backgrounds and experience, their advice and counsel tend toward technical assessment issues rather than issues such as public communications, State support, or Federal coordination. Specific areas of responsibility are not assigned to specific ET members to monitor and assess the adequacy of NRC's actions and performance in fulfilling NRC's LFA responsibilities. This can also contribute to uneven ET attention to the NRC's effectiveness in achieving each of its LFA response responsibilities. As a result, the ET may place more than optimum attention on reactor and radiological assessment, with less than optimum attention on other LFA responsibilities such as coordinating all federal on scene actions, coordinating federal information to the public, media, etc., and assisting the State and local governments. Moreover, special expertise in public affairs or Congressional Affairs is not represented within the ET composition to ensure that the NRC's Federal spokesperson's role and responsibility are effectively implemented. Similarly, NRC coordination of the Federal response may involve substantial EPA, USDA, DHHS, and DOE resources. These agencies also have considerable independent authority that may be applied during an emergency at a NRC-licensed facility. In cases where significant resources from other Federal agencies are applied it may be appropriate for a specific ET member to be assigned the lead for monitoring the effectiveness of NRC's Federal coordination role.

Initiative: Consider organizing and composing the ET to include NRC senior managers having broad and specialized knowledge and experience across all of the LFA responsibility areas, including Congressional affairs, Federal coordination, public information and State support.

<u>Responding to Hurricanes</u>

According to the 1997 AEOD study discussed in Section 2.3, about 80 percent of the FTEs expended in 1996 in responding to actual events in one region (i.e., about 0.75 FTE out of 0.9 FTE), involved response activities for hurricanes and tropical storms. This represented about 30 percent of the 2.6 FTEs spent by all regions in responding to actual events. Response activities for hurricanes often includes entering the monitoring phase of normal mode, dispatching satellite equipment to potentially affected plants and sending regional inspection staff to relieve resident inspectors (RIs) at the potentially affected facilities to attend to family and personal residence preparations before the hurricane's arrival. The FTE that is expended in responding to hurricanes is a significant percentage of the total FTEs expended on actual response activities, in large part because of the length of time the NRC is in a hurricane monitoring mode.

Power reactors are designed for hurricane conditions and are generally required by plant procedures to be shut down hours before the onset of hurricane force winds at the site. Additionally, extensive emergency plan procedures for hurricanes are implemented at the site in advance of a hurricane's arrival. Reviews conducted in connection with the Station Blackout Rule have also resulted in plant-specific actions to reduce the potential for a total loss of all offsite and onsite AC power sources. Accordingly, plants have generally sustained hurricane force conditions with very limited reduction in plant safety margins. The most severe damaging hurricane to hit a nuclear power plant was Hurricane Andrew, which passed over Turkey Point on August 24, 1992. Hurricane Andrew was a Category 4 hurricane with winds estimated at 158 MPH. Although the hurricane caused significant damage to site buildings and facilities, the nuclear portion of the plant contained within the Class I structures withstood these wind velocities as designed. As a result, the Class I structures suffered no damage from the hurricane except for minor water intrusion and some damage to insulation and paint. The plant lost all offsite power during the storm and for 5 days thereafter. Additionally, all offsite communications were lost during the storm for about 4 hours. Portable communications equipment was used at the plant until normal communications were restored. The emergency diesel generators (EDGs) automatically picked up safety-related loads and powered the plant emergency systems during the recovery until offsite power was restored. Experience has shown that for the vast majority of hurricanes (i.e., category 3 or lower) that pass near or over a nuclear power facility, other than a loss of offsite power, safety margins are not significantly reduced.

The recent Davis-Besse alert is an example of the damage and degradation that can occur as a result of severe weather conditions such as hurricanes. For the Davis-Besse event, a loss of offsite power occurred when tornadoes and lightning passed over the site with little advance warning. The NRC could not anticipate the severe weather, since it could not track or monitor the severe weather condition in advance of its onset. The NRC's incident response activities commenced after the loss of offsite power occurred and an alert was declared by the licensee. Although the potential for tornados affecting the site was not tracked (and could not be reliably tracked with current technology) the response was viewed by NRC senior management as highly effective.

Initiative: Except for the most severe hurricanes (e.g., Category 4 or 5), discontinue tropical storm and hurricane monitoring (i.e., continuous incident response center staffing) after verifying that all onsite emergency AC power systems are fully operable at the potentially affected facilities. Hurricane paths should be *tracked* solely to ensure that satellite communications are pre-positioned and the resident inspectors are relieved, as needed, at the potentially affected facilities.

First Responder Roles and Responsibilities

In principle, for the reactor incident response, ERDS, ENS and ETS would be expected to provide HQ and the regional offices with the technical information needed for the NRC to successfully achieve its initial incident response function goals and objectives. However, the direct observation and verification of an onsite NRC responder, who is in a position to directly assess the licensee's technical activities, stress and accuracy of the transmitted information, provides a unique capability for confirming the adequacy of the licensee and NRC response in an actual emergency. Confirmation of the proper event classification is essential, since NRC and State response decisions are implemented in large part on the basis of the event classifications.

The first responder duties of the RI and senior RI are documented in the regional supplement to NUREG-0845. However, three separate NRC groups currently assess the licensee event classifications in an emergency. Specifically, these include HQ, the regions, and the SRI/RIs. As such, each region maintains emergency response procedures (ERPs) for sites at the regional offices, HQ maintains ERPs for all sites, and the SRI/RI offices maintain site-specific copies of the ERPs.

Initiative**:** Ensure that first responders are trained for the task requirements of NUREG-0845 and remain qualified for their first responder duties.

Initiative: Eliminate HQ maintenance of site-specific ERPs. If needed at HQ, utilize a fax to obtain a site-specific copy from the region. Alternatively, the generic emergency action levels (EALs) may be used (with caution) to assess licensee classification decisions.

Joint Operations Center

Currently, the FRERP provides for the concept that Federal agencies will establish a Joint Operations Center (JOC) in the vicinity of a reactor accident. This concept has not been tested, and the NRC staff is not clear as to this facility's location and function. Interviews with staff members from the Incident Response Program office indicated that some thought that the JOC would be located at the licensee's emergency operations facility (EOF). However, when licensees constructed EOFs, no requirement was placed on them to provide for personnel other than their own responders and State and local officials. As a result, EOFs do not have additional room to accommodate responders from other Federal agencies.

Initiative**:** Revise NRC response procedures to ensure that a suitable facility is identified and established if needed, separate from the EOF, if and when the EOF is found to be inadequate to accommodate and co-locate Federal responders with licensee responders and State and local officials.

4.2 Fuel Cycle Facility Incident Response Function

This section describes the team's assessment of the incident response process for fuel cycle facilities (FCFs), which include nuclear fuel conversion, enrichment, and fabrication facilities. Independent spent fuel storage installations and high-level waste facilities are also required to have an emergency plan. The NRC's response to incidents at these facilities, including the concept of response operations, is similar to that of power reactors, described previously in Section 2.1.

The methodology for this assessment included an effectiveness review to identify activities considered essential to team-identified program goals documented in Section 3.1, an efficiency review to identify opportunities for improvements, and a process to identify and evaluate alternatives.

Regulatory Requirements and Guidance

The NRC established event reporting requirements for FCFs in Title 10 of the *Code of Federal Regulations*, Parts 40, 70, 73, 74, and 76. Table 4.2-1 lists the major FCFs and their locations. Depending on the safety significance of the incident, a regulatee[10] is required to report an incident to the NRC within 1, 4, or 24 hours. Unlike commercial power reactors, there are only two emergency classifications for FCFs, *alert* and *site area emergency*. Because of the differing characteristics of nuclear power plant and FCF events, the emergency classification criteria are different. The NRC also provides additional guidance on emergency classification and event reporting criteria in various technical documents and generic communications.

Table 4.2-1 Major Fuel Cycle Facilities in Each Region

Region	Name and Location of Major Fuel Cycle Facilities
Region I	None
Region II	BWX Technologies, Inc.† (Lynchburg, VA) Framatome Cogema Fuels (Lynchburg, VA) General Electric (Wilmington, NC) Nuclear Fuel Services, Inc.† (Erwin, TN) Westinghouse (Columbia, SC)
Region III	ABB Combustion Engineering Inc. (Hematite, MO) Allied Signal, Inc. (Metropolis, IL) Paducah Gaseous Diffusion Plant† (Paducah, KY) Portsmouth Gaseous Diffusion Plant† (Piketon, OH)
Region IV	Siemens Power Corporation (Richland, WA)

†Facilities with an NRC resident inspectors

[10] The term "regulatee" refers to licensees regulated under Parts 40 and 70 and certificate holders under Part 76.

Current Incident Response Practice

In addition to radiological hazards, the potential major safety hazards at FCFs are fire, chemical releases, and criticality. Chemical hazards are evaluated based on risk in accordance with 1988 and 1996 memoranda of understanding with OSHA. Prompted by a fire at the Nuclear Fuel Services' (NFS) FCF in 1996, the Fuel Cycle Safety Team (FCST) was formed and staffed with fire, chemical, and criticality safety specialists. A chemical dose assessment specialist was also included on the protective measures team (PMT) to address potential chemical releases. Technical tools such as the computer modeling programs RASCAL, computer-aided management of emergency operations (CAMEO), and aerial locations of hazardous atmospheres (ALOHA) and training are also available to responders to project radiological and chemical releases.

The SA team interviewed staff and responders from NMSS, OSP, and the Incident Response Program office to understand the current incident response processes and practices for FCFs. In accordance with NRC regulations and regulatee implementing procedures, regulatees report abnormal conditions to the NRC HOC. On the basis of the safety significance and the type of event, the HOO will promptly notify the NMSS emergency officer (EO), the RDO, and the manager-on-call from the Incident Response Program office. For safeguards events, the IAT will be notified to evaluate the credibility of the event. If the regulatee declares an alert or a site area emergency, senior management from the Incident Response Program office will also be notified. In selected cases, the EO and RDO will request that other NRC staff (e.g., the RA or technical specialists) be added to the conference call and be briefed on the event. By written procedure, the EO and RDO are required to make the decision on NRC's response within 30 minutes. A flow diagram for the current decision-making practice is shown in Figure 2.1 in Section 2.1. After the decision is made, the NRC may enter into one of the four response modes (i.e., normal, standby, initial activation or expanded activation) described in Section 2.1.

4.2.1 Effectiveness Review

The SA team also conducted an effectiveness review for all significant response activities associated with current FCF response functions. The purpose of the review was to identify response activities that were "critical" to achieve the incident response goals and objectives defined in Section 3.1. Activities by which the SA team identified as noncritical can be viewed as potential candidates for elimination.

The first step in the effectiveness review was to determine all of the current activities involved in NRC receiving a report of an incident at an FCF, making a response decision, and activating the NRC's response. Incident response activities were identified on the basis of a review of the current incident response practice. An activity was considered critical if not performing the activity would result in ineffective performance or failure to meet one or more of the program goals or objectives.

As a first step in the review, the SA team developed a list of potential critical activities on the basis of the current practice. The list included all of the activities performed by NRC HQ, the region, and the site in each response mode. The SA team also reviewed current NRC commitments and conducted interviews to identify any potential candidate critical activities that are not currently documented. This review identified several additional potential candidate critical activities that involve liaison with other Federal agencies, such as FEMA HQ, FBI HQ and onscene response, and the EPA OSC.

The effectiveness review identified only a few noncritical activities, including counterpart links between teams and selected highly specialized technical positions (e.g., instrumentation and control system analyst). Counterpart links were not considered critical because, in most cases, inter-team communication is accomplished by individual team members. Depending on the type of event, certain specialists were not considered critical early in an event because in-depth information needed to perform a detailed technical analysis requiring these specialists would generally not yet be available. During the initial phase of an event, analyses will be general and associated with areas such as accident progression and radiological consequences, which were identified as critical. Experts can be called in if needed once the nature of the incident is better understood.

The critical activities identified were catalogued into the following 15 categories:

1. Receive notification
2. Make response decision
3. Activate response
4. Support response
5. Assess fuel cycle facility conditions
6. Assess radiological and chemical conditions
7. Assess safeguards
8. Direct response
9. Keep others informed
10. Support media
11. Coordinate deployment of Federal response to the scene
12. Provide liaisons with Federal activities in HQ area
13. Coordinate and direct on-scene Federal response
14. Observe licensee response actions
15. Coordinate with State and local officials

In the 15 response categories, the SA team identified 80 critical activities.

4.2.2 Efficiency Review

The SA team conducted a review to identify where current FCF response processes might be improved from the standpoint of efficiency (e.g., cost, quality, timeliness, and reliability). The team assessed whether FCF response functions “were being done the right way,” or whether there were opportunities to perform these functions more efficiently. The efficiency review considered the critical FCF response activities performed by HQ, the regional base, and initial site teams identified in Section 4.2.1.

HQ incident response staff, NMSS staff, HQ Office Directors, and RAs provided insights on current response processes and supporting readiness activities with respect to costs, quality, timeliness, and reliability. Source documents for the concept of operations of incident response were also examined. A reactor exercise was observed from the perspective of the HOC to obtain additional insights for FCF events. A public meeting with external stakeholders, held on June 16, 1998, also provided some additional views on the current practices for incident response functions. In addition, the SA team examined budget information describing the level of resources currently expended by HQ and the regions to support response readiness.

Overall, the SA team concluded that the current FCF incident response practice supports the program goals and performance objectives developed by the team (see Section 3.1). However, a number of issues were identified as described below.

<u>Cost Considerations</u>

<u>Event Notification</u>

Experience with reported FCF events indicates that many reported events have low risk or low safety significance. In addition, several recent FCF emergency notifications raised questions regarding emergency classification criteria. A brief preliminary review of the current reporting requirements in Bulletin 91-01, "Reporting Loss of Criticality Safety Controls," noted that the event reporting and emergency classification criteria may not be commensurate with the associated risks. The proposed revision of 10 CFR Part 70 has considered risk factors for event notification and reporting requirements. The team anticipates that the implementation of this revision, possibly in FY 1999 or FY 2000, will introduce risk perspectives into event reporting criteria and reduce the incidence of event reports with low risk.

The team also reviewed the number of events reported for FCFs. On the basis of data in the nuclear material event database (NMED), the number of events reported for FCFs ranged from 15 to 80 each year from 1990 to 1996. However, the number of events reported annually increased significantly to 158 in 1997 and 139 in January through May 1998. More than 90 percent of the events in 1997 and 1998 were from gaseous diffusion plants (GDPs) regulated under 10 CFR Part 76. From an incident response perspective, the vast majority of the events reported by GDPs are relatively low in safety and risk on an individual basis. The elevated number of event reports imposes a workload on licensee response personnel in making reports and adds to the workload of the HOOs, who are responsible for taking the notifications and evaluating if the event requires a safety or safeguards assessment, and the EO and RDO who assess the safety significance of the event. The relatively frequent but low safety significance notifications also have the potential to lower the staff's safety sensitivity to GDP events. However, the staff also noted that some of the GDP events may provide information on precursors to potential significant issues or generic concerns.

Initiative: Revise GDP event notification and reporting requirements on the basis of risk and safety significance. Events involving low safety significance and low risk significance should be submitted to the NRC as 30-day written reports.

Response Decision-Making

The current process for response decision-making and activating a response (see Section 2.1) can be time-consuming and resource intensive. As demonstrated in the Seimens fire event in April 1998, up to 10 NRC staff members can be included on the response decision-making telephone conference call. The team noted that, given the diversity of FCF regulatees, some NMSS EOs may not be familiar with FCF operations and may need to request technical assistance. In some cases, more than one technical staff member may be requested for assistance.

The FCF event notification process, criteria, and decision-making process are documented in the NMSS emergency officer (EO) procedure, dated June 1990. A draft revision of the procedure has been prepared to streamline the process. The draft procedure, dated November 12, 1998, also provides revised guidance on the appropriate level of NRC's response on the basis of potential risks of event conditions. With clear criteria and adequate implementation of the revised procedure, it would be more efficient for NRC decision-makers to make appropriate response decisions and reduce the number of conference call participants. Effective implementation of risk-informed and safety-based criteria within the procedure would ensure resources are directed to risk significant events and areas, simplify the current response decision-making and activation processes, and provide timely response.

Initiative: Ensure that risk-informed criteria are available in the evolving NMSS EO procedure revision to guide the response decision-making for FCF events.

Figure 4.1 in Section 4.1.8 shows an alternative streamlined approach proposed by the SA team for response decision-making and applicable to reactor and FCF events. In the proposed approach the safeguards assessment, safety assessment, and decision-making would be combined into one step. The EO and RDO would be given the authority and responsibility for decision-making, subject to the development and implementation of appropriate criteria and training (qualification) to promptly decide on activation. An Incident Response Program member would be on the conference call and be given the responsibility to provide advice on response protocols and to initiate activation. Additional expertise and analysis may be requested to assess the safety significance and response for an event if the decision cannot be made from the established guidance and criteria. Streamlining the decision-making process would reduce the workload on the HOO during an event, speed up the response process, and keep the focus on making the activation decision.

Initiative: Streamline the response decision-making and activation processes to make them more timely and resource efficient.

Fuel Cycle Facility Incident Response

The concept of operations for FCF incidents is described in Section 2.1. Currently, the NRC maintains a relatively large HOC response team (approximately 51 to 54 members) for FCF events. Each HOC response team position for FCF involves at least three qualified responders to allow for responder unavailability or the potential for two concurrent events, and to relieve responders for long-term response. Therefore, relatively large rosters must be maintained and response personnel availability checked periodically. The HOC response organization for FCF events is identical to the response organization for power reactor events, except that the reactor safety team (RST) is replaced with the fuel cycle safety team, the safeguards team — reactors is replaced with the safeguards team — fuel cycle, and the protective measures team — reactors is replaced with the protective measures team — fuel cycle. (NMSS is in the process of combining the fuel cycle safety team and fuel cycle safeguards team.) Further evaluation of all positions on the HOC, regional base and, initial site teams noted that a few response activities are performed by more than one position in different teams and locations. For example, consequence assessments and protective measures evaluations have been performed by the HOC and the regional base team.

Each region has its own ERC and IRC. Currently, some regions have limited resources budgeted for FCF activities, including incident response. With the budget constraint, it may be difficult for some regions with FCFs to maintain initial site team response readiness. In addition, since FCF incidents typically last less than an hour, the need for site response is infrequent.

<u>Quality Considerations</u>

Staff knowledge and familiarity with FCF design and operation are important incident response quality factors. Most technical expertise associated with the high-risk aspects, such as criticality safety, chemical safety, and fire safety resides in HQ. Regional strengths are in local response coordination, facility operations, and facility radiological programs. At least 2 to 3 positions in the regional base team need to be staffed by personnel familiar with FCF design and operation while the rest of the team supports coordination and communication activities. In general, the base team would rely on HQ staff to provide technical assistance, especially for high-risk aspects. However, certain levels of familiarity with FCF technology for the regional base team members would enhance their ability to deal with FCF events.

Generally, HOOs are more highly trained and knowledgeable in the area of power reactor technology and more readily understand power reactor events. Recently, more FCF technical instruction has been included in the HOO’s qualification. However, limited experience with FCF technology has in some cases reduced the efficiency (e.g., quality and timeliness) with which HOOs process FCF event notifications.

Initiative: Require HOOs and FCF team members to take FCF-related technology courses. Both HOOs and FCF responders should participate in an FCF tour or observe an FCF inspection.

Currently, NRC’s first responders are not required to have hazardous waste operations and emergency response (HAZWOPER) training. Under the requirements of the Occupational Safety and Health Administration (OSHA), this training is required for entering a hazardous environment. A similar responder training requirement has been discussed for reactor facility RIs (as the first responders); however, no conclusion has been reached at this time.

Initiative: Determine the need for first responders to receive hazardous material response (i.e., HAZWOPER) training. Coordinate with OSHA to provide adequate training for NRC first responders.

The fuel cycle safety team (FCST) was formed in late 1996, and to date, the FCST has participated in only one exercise. Integrated training and more frequent exercises with regulatees have been considered to familiarize FCST members with their response duties and the overall response process. Training on technical tools (RASCAL, CAMEO, and ALOHA) is available to response team members. Although, proficiency with these tools is essential in performing their duties during an emergency, this training on the technical tools is not always mandatory.

Currently, a safeguards specialist (i.e., physical protection, material control and accounting) is included in the response only when recommended by the IAT or at the discretion of the FCST Director. A safety-related event at an FCF with special nuclear material (SNM) may raise potential safeguards concerns, such as theft and access control. There is a need to balance the evaluation of safety significance with the evaluation of safeguards significance during FCF exercises and FCF response training.

Initiative: Increase the use of drills, table tops, or other methods to provide team and integrated training for FCF response teams as resources allow. Exercises should be for safety and safeguards scenarios.

It is expected that FCF events will be terminated or under control within only a few hours and typically before the initial site team could arrive at the site. Therefore, it is perceived that no response function will be performed by the initial site team once it arrives. This is contrary to the experience from the 1986 Sequoyah Fuel Corporation accident time line (Table 4.2-2). During the Sequoyah accident, the release lasted for less than an hour, and the NRC onscene response lasted for 11 days. During the response, the team coordinated the Federal response, acted as the spokesperson for the Federal government, briefed Congress, held press briefings, coordinated monitoring activities, assessed the actual and potential health impact, and so forth. In accordance with FRERP, NRC response is not over until the support is no longer needed by State and local officials. As past experience has shown, for an event with significant press and public interest, the NRC response could last for days or weeks.

Although an FCF initial site team may be needed infrequently, the focus of the team is expected to be different from that of a power reactor initial site team. The main focus of the FCF initial site team would be recovery and coordinating Federal response. Therefore, the composition of the initial site team would need to be organized accordingly. Additionally, unlike power reactors, FCFs are not required to have, and most do not have, adequate space to accommodate an initial site team.

<u>Timeliness Considerations</u>

When an initial site team is needed, the estimated travel times for a response team dispatched from HQ or a regional office are shown in Table 4.2-3. As discussed in Section 4.1.6 for

Table 4.2-2 Sequoyah Fuel Corporation (Gore OK) Accident Time Line

Day	Event
One 1/4/86	• 14-ton UF_6 cylinder ruptures • NRC notified • Road closed about 1 mile from the site • Off-site officials advise potentially exposed residents to go to hospital • Press release issued • Hot line established • DOE aerial survey requested • NRC HOC activated • NRC response team coordinates activities with Oklahoma State official • Augmented inspection team (AIT) investigation in parallel with response • Oklahoma State Dept of Health officials dispatched to site
Two	• Press conference with congressman and Oklahoma State officials
Three	• AIT starts to interview plant staff • Press conference held (daily) near plant (NRC, OK, and plant personnel) • Response team reviews plant clean up plans to assure adequate worker protection • Plant informs the public about the upcoming aerial surveys • 15 NRC staff at site
Five	• AIT starts to analyze information gathered • Response team: (1) determines plume trajectory on the basis of surveys and sample analysis, (2) continues to monitor health effects and (3) analyzes impact on animals in plume path • DOE aerial monitoring expected to begin but delayed due to FAA airworthiness directive • Media interest in event remained steady • Response team leader appears at evening meeting with local school board on long-term health impact on students
Six	• AIT information gathering nears completion • Aerial survey to monitor uranium and damage to vegetation begins • Response team leader briefs news media
Seven	• Response team: (1) discusses detailed plans for clean-up, (2) continues HP and environmental assessments, (3) aerial surveys continue (expected to be complete on day eleven) and (4) continues to work closely with State officials • AIT completes interviews
Eleven	• DOE aerial surveys completed

reactors, time factors include ground transportation travel time to an airport, flight time in the air, and ground transportation travel time to the site. From the time the decision is made to send a team to the site, it is estimated that it would take 1 to 2 hours for the team to get to the airport. It is assumed that a commercial flight would be boarding and the team could get on board.

Table 4.2-3 Timeliness of Initial Site Team - Fuel Cycle Facilities

Location	Timeliness of Initial Site Team
HQ	Average 6-8 hours to most FCFs; About 8-10 hours to Washington State
Region I	Not applicable: No FCFs.
Region II	Average 3-4 hours to most FCFs
Region III	Average 4-5 hours to most FCFs
Region IV	About 6-7 hours to Washington State

Because of the uncertainties for the rapid departure on commercial flights, most regions have arranged for charter service if a plane is available. Commercial flight times were computed on the basis of information available in the computer-based Federal travel directory. Charter service flying times were, on the basis of discussions with charter service personnel faster, but in many cases more expensive than regularly scheduled airline flying times. After the team's arrival at the closest local airport, the time to reach the site was assumed to be the time it would take to obtain a rental car and drive to the site. The extent to which *response* functions would be performed by an FCF initial site team is expected to be limited since the site team travel time is relatively long compared to the expected duration of an ongoing hazard at an FCF.

As previously noted, the need for an FCF initial site team is expected to be rare and the purpose of the FCF site team may not require a timely arrival at the site. Therefore, timeliness is not expected to be an important consideration for an FCF site team response. Four FCFs with higher risks have RIs, and two other FCFs are very close to an FCF with an RI. However, RIs are normally considered as the first responder rather than a part of the initial site team.

4.2.3 Incident Response Options

Six response options were developed by the team. The options (shown in Table 4.2-4) would streamline the response organization (minimum staffing) and provide alternative response approaches (concepts of operations).

The first option is the *current practice* in terms of team staffing levels and the current concept of operations in which the region has the lead in normal mode and HQ supports the regional lead. HQ assumes the lead in standby mode with the region supporting HQ in monitoring the incident. The region's primary focus is to prepare to dispatch a team to the site from the region. During initial activation mode, HQ continues to lead the NRC response. The regional base team continues to support HQ and dispatches an initial site team. Expanded activation mode starts when the regional initial site team arrives at the site and is formally authorized to lead the NRC response. HQ and the regional base team support the initial site team in coordinating response efforts at the site. In full Federal activation mode, additional responders supplement the initial site team to coordinate with other Federal agencies responding to the scene of the emergency. During each mode of this option, the number of responders for the HOC, regional base and initial site teams, corresponds to the current practice.

Table 4.2-4 Alternative Incident Response Concepts - Fuel Cycle Facilities

		INCIDENT RESPONSE MODE				
#	**Option Description**	**Monitoring Phase of Normal**	**Standby**	**Initial Activation**	**Expanded Activation**	**Full Federal Activation**
1	HQ Lead in Standby** Regional Site Team Current Practice	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead*	Reg BT Support	Reg BT Support	Reg BT Support	Reg BT Support
				Reg ST Depart	Reg ST Lead	Full ST Lead
2	HQ Lead in Standby Regional Site Team Minimum Teams	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead	Reg BT Support	Reg BT Support	Reg BT Support	Reg Support
				Reg ST Depart	Reg ST Lead	Full ST Lead
3	HQ Lead in Standby HQ Site Team Minimum Teams	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead	Reg BT Support	Reg BT Support	Reg BT Support	Reg BT Support
				HQ ST Depart	HQ ST Lead	Full ST Lead
4	Region Lead in Standby Regional Site Team Minimum Teams	HQ Support	HQ Support	HQ Support	HQ Support	HQ Support
		Reg BT Lead	Reg BT Lead	Reg BT Lead	Reg BT Support	Reg BT Support
				Reg ST Depart	Reg ST Lead	Full ST Lead
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	HQ Support	HQ Support	HQ Support	HQ Support	HQ Support
		Reg BT Lead	Reg BT Lead	Reg BT Lead	Reg BT Support	Reg BT Support
				NRC ST Depart	NRC ST Lead	Full ST Lead
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	HQ Support	HQ Lead	HQ Lead	HQ Support	HQ Support
		Reg BT Lead	Reg BT Support	Reg BT Support	Reg BT Support	Reg BT Support
				NRC ST Depart	NRC ST Lead	Full ST Lead

* Shaded box indicates lead for the mode (e.g., the regional base team has the lead in normal mode in all options)
** Lead in Standby *and* Initial Activation

The second option is identical to the first option except that during each mode, the HQ response organization in the HOC, the regional base team and the regional initial site team are each composed of responders, the number of which corresponds to the *minimum team staffing* needed to carry out critical response activities (see Section 4.2.1).

The third option is identical to the second option (i.e., minimum team staffing) except that the concept of operations is changed so that *HQ dispatches the initial site team* (instead of the region), which is composed of HQ responders. The HQ initial site team assumes the lead for the NRC response in expanded activation mode.

The fourth option is identical to the staffing and concept of operations in the second option except that *the region has the lead during standby and initial activation*, with HQ supporting the regional base team. The regional base team composition and staffing is expanded to accommodate the additional responsibilities and the HOC staffing is decreased. The initial site team is dispatched by the region and composed of regional staff.

The fifth option is identical to the fourth option except that an *intra-NRC initial site team*, composed of a core of regional responders supplemented by responders from HQ and the other regions, is dispatched to the site during initial activation mode. During standby mode, the initial site team is organized by HQ. During initial activation, the regional office dispatches the core of regional responders on the intra-NRC initial site team, while HQ ensures dispatch of responders who fill the non-core positions on the intra-NRC initial site team. It is assumed that the affected regional core group will occupy the positions such as the DSO, emergency response coordinator and government liaison coordinator. In expanded activation mode, the intra-NRC initial site team assumes the lead for the NRC response.

The sixth option is identical to the second option except that an *intra-NRC initial site team*, composed of responders from HQ and the regions, is established and organized by HQ. The intra-NRC initial site team assumes the lead for the NRC response in expanded activation.

In summary, the six incident response options represent the significant variations in HQ and regional lead responsibilities in standby and initial activation modes and in dispatching an initial site team. The option of placing HQ in the lead in normal mode is not considered a significant variation since it may be implemented within the boundaries of any of the six options. The last two options are intended to analyze the benefits of composing initial site teams from a single NRC roster of qualified responders. Each option will have associated costs and advantages and disadvantages with respect to quality, timeliness, and reliability in achieving the team-developed incident response goals and objectives identified in Section 3.1.

4.2.4 Analysis of Incident Response Options

The team utilized the results of effectiveness review for the six options to focus on critical activities for achieving the program goals and objectives. The first option represents currently implemented staffing levels for the current concept of operations. These staffing levels reflect the actual staffing levels utilized in practice by HQ and the regions for full-participation exercises. On the basis of the effectiveness review, Options 2 — 6 show the minimum staffing for critical activities, assuming that critical activities will be performed by one qualified person in one team at one location. The results from the analysis are shown in Table 4.2-5.

The team assessed the quality of performance for each option in terms of cost, quality, timeliness, and reliability. For the quality assessment, four NRC staff members with extensive experience and knowledge in the Incident Response Program and its implementation evaluated each option. The review group included two regional staff members with extensive ERC experience, one HQ senior staff member with extensive knowledge and experience with the HQ incident response functions and activities, and one HQ senior staff member with extensive incident response function and FCF operations experience. The timeliness and cost considerations were analyzed by the SA team. Reliability considerations were developed on the basis of the comments from the review group and analysis of the team.

Cost Considerations

The minimum staffing level for the HOC team is estimated to be 34 compared to 51 to 54 for the current practice. The reduction resulted primarily from streamlining the management structure of each function team at HQ. For example, the HQ ET was replaced by a single decision-maker (typically the Chairman) and functional team deputy directors were eliminated. The HOC team directors provide advice and assistance to the single decision-maker rather than the ET members. Additional reductions are achieved by elimination of a few noncritical activities as described earlier.

There are small reductions in the staffing for regional base and initial site teams. The differences reflect the elimination of protective measure manager, status board plotter, and administrative support from the regional base team, and health physics specialist, status summary coordinator, and status summary communicator from the initial site team. This was based on the assumption that the activity would be performed by only one qualified HOC team member. When the region leads the response, it is assumed that some response duties will remain in HQ, such as coordination with the HQ offices of other Federal agencies. The overall staffing requirement is the same for Options 2 — 6 because it is assumed that critical activities are performed by only one qualified responder on one team at one location. However, the overall NRC roster size would need to consider multiple regions, and Table 4.2-5 provides additional information on the size of the NRC roster size for each option. Table 4.2-6 provides the incremental FCF roster size for each option, which will be used to estimate potential savings from the reduction in response teams. The estimated NMSS expenditures in response training and exercises are 0.5 FTE and 0.6 FTE, respectively. Although savings are expected from the reduced staffing for Option 2, the actual savings are small and estimated to be about 0.2 FTE less than Option 1 (i.e., the current practice). The savings for Option 6 is estimated to be about 0.3 FTE less than Option 1.

The review group considered the response team staffing reductions to be generally beneficial. It saves resources and focuses the response on critical activities and high-risk aspects and areas. Some review group members believed that the overall staffing might be further reduced from the staffing presented in Option 2 if the response activities were tightly focused on the risk and safety significant aspects.

Various concepts for an initial site team also offer opportunities for resource savings. With an intra-NRC initial site team, the roster size would be reduced from three regional initial site teams to one intra-NRC initial site team. However, the resource savings may be offset by challenges in maintaining and administering the NRC-wide roster. A HQ initial site team would offer additional savings from reduced roster size. In addition, the travel cost (airfare) to most facilities may be lower from the Washington, DC area than from other locations.

Initiative: Implement a trial program to assess the acceptability of minimum teams for the HOC, regional base, and initial site teams within the current concept of operations (Option 2). On the basis of the results of the trial program, establish the minimum team approach on a permanent basis, as appropriate.

Table 4.2-5 Required Staffing for Alternative Concepts of Operation by Response Mode - Fuel Cycle Facilities

Staffing for alternative Concepts of Operations						
#	**Option Description**	**Monitoring Phase of Normal Mode**	**Standby**	**Initial Activation**	**Expanded Activation**	**Full Federal Activation**
1	HQ Leads Standby Regional Site Team Current Practice	HQ 11-13 BT 7-9 ST 0 **Total 18-22**	HQ 51-54 BT 10 ST 0 **Total 61-64**	HQ 51-54 BT 10 ST 9 **Total 70-73**	HQ 51-54 BT 10 ST 9 **Total 70-73**	N/A
2	HQ Leads Standby Regional Site Team Minimum Teams	HQ 9 BT 6 ST 0 **Total 15**	HQ 34 BT 7 ST 0 **Total 41**	HQ 34 BT 7 ST 6 **Total 47**	HQ 34 BT 7 ST 6 **Total 47**	N/A
3	HQ Leads Standby HQ Site Team Minimum Teams	HQ 9 BT 6 ST 0 **Total 15**	HQ 34 BT 7 ST 0 **Total 41**	HQ 34 BT 7 ST 6 **Total 47**	HQ 34 BT 7 ST 6 **Total 47**	N/A
4	Region Leads Standby Regional Site Team Minimum Teams	HQ 7 BT 8 ST 0 **Total 15**	HQ 14 ST 27 ST 0 **Total 41**	HQ 14 BT 27 ST 6 **Total 47**	HQ 14 BT 27 ST 6 **Total 47**	N/A
5	Region Leads Standby Intra-NRC Site Team Minimum Teams	HQ 7 BT 8 ST 0 **Total 15**	HQ 14 ST 27 ST 0 **Total 41**	HQ 14 BT 27 ST 6 **Total 47**	HQ 14 BT 27 ST 6 **Total 47**	N/A
6	HQ Leads Standby Intra-NRC Site Team Minimum Teams	HQ 9 BT 6 ST 0 **Total 15**	HQ 34 ST 7 ST 0 **Total 41**	HQ 34 BT 7 ST 6 **Total 47**	HQ 34 BT 7 ST 6 **Total 47**	N/A

1. *Most* significant fuel cycle facility events will be terminated or under control within an hour, and a team may be sent for followup investigation. The investigation team is not considered an initial site team for purposes of incident response.

2. The concept of an intra-NRC initial site team is a core of regional managers to facilitate Federal, State and local interfaces supplemented by the best qualified experts from across the NRC.

Table 4.2-6 NRC-Wide Roster Sizes Required for Alternative Concepts of Operation - Fuel Cycle Facilities

RESPONSE MODE						
#	**Option Description**	**Bench Strength**	**No of Regions or HQ**	**Initial Activation Team Sizes**	**Team Roster Size**	**NRC-Wide Roster Size**
		A	B	C	A*B*C	∑ A*B*C
1	HQ Leads Standby Regional Site Team Current Practice	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 3	HQ 51-54 BT 10 ST 9	HQ 153-162 BT 90 ST 27	270-279
2	HQ Leads Standby Regional Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 3	HQ 34 BT 7 ST 6	HQ 102 BT 63 ST 54	219 (to 274)[**]
3	HQ Leads Standby HQ Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 1	HQ 34 BT 7 ST 6	HQ 102 BT 63 ST 18	183 (to 229)[**]
4	Region Leads Standby Regional Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 3	HQ 14 BT 27 ST 6	HQ 42 BT 243 ST 54	339 (to 424)[**]
5	Region Leads Standby Intra-NRC Site Team Minimum Teams	HQ = 3 BT = 3 $ST_c^{\#}$ = 3 $ST_{nc}^{\#\#}$ = 4[†]	HQ 1 BT 3 ST_c 3 ST_{nc} 1	HQ 14 BT 27 ST_c 3 ST_{nc} 3	HQ 42 BT 243 ST_c 27 ST_{nc} 12	324 (to 405)[**]
6	HQ Leads Standby Intra-NRC Site Team Minimum Teams	HQ = 3 BT = 3 ST_c = 3 ST_{nc} = 4	HQ 1 BT 3 ST_c 3 ST_{nc} 1	HQ 34 BT 7 ST_c 3 ST_{nc} 3	HQ 102 BT 63 ST_c 27 ST_{nc} 12	204 (to 255)[**]

[**] Assumes 25 percent larger bench strength (or 25 percent larger team sizes)
[#] Regional core component of the Intra-NRC initial site team
[##] Non-core component of the Intra-NRC initial site team
[†] The initial site team roster is assumed to be *four* deep for each non-core position.

Quality Considerations

Most technical expertise for the high-risk aspects and areas, such as criticality, chemical, and fire safety, for FCFs are in HQ. Regional expertise generally is in local response coordination, facility operations, and facility radiological programs. During an incident, the regions rely heavily on HQ for technical assistance. None of the review group members considered the region-lead options to be feasible. The primary reasons were insufficient breadth of expertise and insufficient backup responders to provide for an adequate response.

Most FCF events would be terminated or under control in a few hours (before the initial site team arrives). The main focus of the initial site team would be recovery and coordination of the Federal response. Therefore, the composition of the initial site team would need to be assembled accordingly. In general, HQ staff provides better specialized technical expertise, while regional staff provides better assistance in local response coordination. Considering the main focus of the initial site team, familiarity with the facilities may be the most important quality factor. The concept of an HQ or intra-NRC initial site team was evaluated by the review group. All review group members considered that, in most cases, the purpose of NRC onsite presence for an FCF incident would more likely be "incident investigation" rather than "incident response." Until the concept and composition of the initial site team are identified, it would be difficult to evaluate these options of an initial site team.

Similar to power reactors, a regional initial site for FCF incidents is composed solely of regional responders from the affected region while an HQ initial site team would be composed solely of HQ responders. It is assumed that an intra-NRC initial site team for FCF events would be composed of a core group of responders from the affected region, supplemented by responders from HQ and the other regional offices. The regional core group would occupy the positions of the DSO, emergency response coordinator and government liaison coordinator. Non-core positions on the initial site team would generally involve a fuel cycle safety coordinator, a protective measures coordinator, and a technical specialist that would be filled by responders from HQ and the other regions. Composing and staffing the core group in this manner would ensure that the initial site team members who arrive first at the site occupy the significant leadership, communications and coordination positions on the team, and involve individuals who are most knowledgeable of the facility-specific design and operations, and emergency response plan and local emergency response personnel. In general, the FCF intra-NRC initial site team would be composed of NRC staff members who are the most highly qualified responders in each position. Therefore, the expected quality of performance of the members of an FCF intra-NRC initial site team should be as good as or better than a regional initial site team or an HQ initial site team.

Initiative: Reevaluate the FCF initial site team concept and composition. Develop guidance for dispatching an FCF initial site team including its function and composition. Conduct an in depth evaluation and trial program of alternative initial site team options, especially the intra-NRC initial site team.

Timeliness Considerations

As stated in Section 4.2.2, timeliness is generally not anticipated to be a driving factor for FCF initial site team response.

Reliability Considerations

The SA team evaluated the availability of responders during an emergency for each option. HQ FCF responder call out experience has shown occasional unavailability of responders in filling all response positions, and the regions effectively control the availability of responders. Smaller response teams would be expected to improve filling required positions, although positions

Table 4.2-7 Incremental† Roster Sizes Required for Alternative Concepts of Operation - Fuel Cycle Facilities

Incremental NRC-Wide Roster Sizes							
#	**Option Description**	**Bench Strength**	**No of Regions or HQ**	**Initial Activation Team Sizes**	**Team Roster Size**	**Increment NRC-Wide Roster Size**	**Ratio Optn n to Optn 1**
		A	B	C	A*B*C	∑A*B*C	
1	HQ Lead in Standby Region Site Team Current Practice	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 3	HQ 20 BT 3 ST 3	HQ 60 BT 27 ST 27	114	1.00
2	HQ Lead in Standby Region Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 3	HQ 13 BT 3 ST 3	HQ 39 BT 27 ST 27	93	0.82
3	HQ Lead in Standby HQ Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 1	HQ 13 BT 3 ST 3	HQ 39 BT 27 ST 9	75	0.66
4	Region Lead in Standby Regional Site Team Minimum Teams	HQ = 3 BT = 3 ST = 3	HQ 1 BT 3 ST 3	HQ 4 BT 12 ST 3	HQ 12 BT 108 ST 27	147	1.29
5	Region Lead in Standby Intra-NRC Site Team Minimum Teams	HQ = 3 BT = 3 ST_c = 3 ST_{nc} = 4	HQ 1 BT 3 ST_c 3 ST_{nc} 1	HQ 4 BT 12 ST_c 1 ST_{nc} 3	HQ 12 BT 108 ST_c 9 ST_{nc} 12	141	1.24
6	HQ Lead in Standby Intra-NRC Site Team Minimum Teams	HQ = 3 BT = 3 ST_c = 3 ST_{nc} = 4	HQ 1 BT 3 ST_c 1 ST_{nc} 1	HQ 13 BT 3 ST_c 1 ST_{nc} 3	HQ 39 BT 27 ST_c 9 ST_{nc} 12	87	0.76

† This table shows the changes specific for fuel cycle facility responders for each option. The responders for ET, liaison team, etc., are not counted again. That is, only the staffing difference in fuel cycle safety team and fuel cycle protective measures team are counted for HQ.

unfilled could more severely hamper the effectiveness of the team since there would be little reserve capacity within the team. The availability of regional initial site teams is well managed with the current practice. Considering the reduced size of a initial site team, there should be less availability concerns for a HQ initial site team.

However, an intra-NRC initial site team, with members departing from various locations would entail significant administrative challenges for maintaining the roster and tracking responder availability as well as significant logistical challenges in dispatching the team from diverse locations. Additionally, all members of an intra-NRC initial site team may not arrive in a timely manner at the site, thereby potentially delaying the turnover of the lead for the NRC response from the Chairman to the initial site team DSO. Section 4.1.6 provides additional discussion of reliability considerations for response options involving an intra-NRC initial site team.

4.3 Nuclear Material Incident Response Function

This section assesses the response process for events and emergencies involving the use of nuclear material at NRC-licensed and Agreement State-licensed facilities or, involving NRC-licensed or Agreement State-licensed nuclear material. In accordance with reporting requirements, NRC nuclear material licensees began reporting significant[11] material events to the HOC in 1991. In 1995, NRC established a policy for Agreement States to report material events to the HOC. Prior to 1995 Agreement State material events were usually reported to the NRC regional offices. While there are about 100 nuclear power plant facilities of only two basic designs (i.e., pressurized water and boiling water), the nuclear material program area in the United States involves about 22,000 material licensees involving approximately 40 different program activities, and thousands of devices and systems.

As discussed in Section 2.1, the NRC's incident response plan (NUREG-0728), including response modes, was not developed to most effectively address the characteristics of significant nuclear material incidents. The plan was developed for the expected characteristics of potential power reactor facility emergencies. Defense-in-depth (e.g., diverse and redundant safety systems, multiple barriers to the release of radioactive material) and operator intervention, generally results in a relatively slow accident progression for power reactors. This enables responders for power reactor emergencies to take measured, but timely actions within the concept of operations and modes that have been developed. For material applications, although the potential consequences to the public are generally much less severe, consequences to the individual or individuals involved in the incident can be high. In addition, nuclear material incident sequences (e.g., lost or broken source capsules, contamination incidents, radiological releases), based on actual experience, progress relatively quickly. Experience to date has indicated that the concept of operations and modes developed for power reactor emergencies are not be well suited nor sufficiently timely in responsiveness for serious material incidents and emergencies. Nevertheless, incident response procedures for nuclear material incidents (e.g., the NMSS EO procedure) reference the response modes developed for power reactor facilities and are documented in NUREG-0728. Since the concept of operations has not been modified for the special characteristics of nuclear material incidents, the NRC's response processes and practices for material incidents are less structured than they are for reactors. Therefore, the NRC's response actions for the vast majority of nuclear material incidents are generally adjusted and tailored on a case-by-case basis to the specific circumstances of the incident within normal mode and monitoring phase of normal mode documented in the EO procedure.

The self-assessment of material incident response included an effectiveness review to identify activities that are necessary and sufficient to achieve the desired results, while eliminating

[11]A "significant" material event is defined as any event or condition involving licensed nuclear material that does, will, or may, impact health and safety. Incidents that fall under this category are required to be reported by the licensee to the appropriate regulatory agency within 24 hours or less.

noncritical, duplicative, or ineffective activities. The SA team also conducted an efficiency review to identify opportunities to perform response activities with greater quality and timeliness, and with fewer resources. The assessment included analysis of possible alternative approaches or response concepts for achieving the response goals and objectives identified in Section 3.1.

Regulatory Requirements and Guidance

The NRC's statutory authority is limited to the safe use of source, byproduct and SNM in 20 States, the District of Columbia, Puerto Rico, U.S. territories, and most Federal facilities. NRC regulates about 5800 material licensees who are required to report nuclear material incidents and events to the NRC in accordance with regulations specified in the U.S. Code of Federal Regulations (10 CFR Parts 20, 21, 30, 31, 33, 34, 35, 36, 39, 40, 60, 61, 70, 71, 73, and 74). Reportable nuclear material events include medical misadministrations or overexposures, lost or stolen material, contamination incidents, leaking sources, equipment problems and transportation events.

The NRC does not regulate the use of other types of radioactive material (i.e., naturally occurring radioactive material, NORM) or machine generated sources (i.e., x-rays, linear accelerators) of ionizing radiation. In accordance with Section 274 of the *Atomic Energy Act of 1954* (AEA, or the "Act"), as amended, "Agreement States" are those States that have entered into a formal agreement with the NRC to regulate the use of source, byproduct, and less than critical mass quantities of SNM, by establishing and implementing adequate and compatible regulatory programs. Under the agreement, the NRC "discontinues" regulatory authority.

There are currently 30 Agreement States, which regulate approximately 15,000 material licensees. The licensees of Agreement States report events to the Agreement State regulatory agencies that are similar to those reported by NRC material licensees under equivalent NRC regulations. Agreement States, in turn, notify the NRC of reported events and provide the NRC with copies of event report information[12]. The regulator (i.e., NRC or Agreement State), is responsible for overseeing licensee response actions and for responding to incidents involving licensed nuclear material.

Pursuant to the AEA and the *Energy Reorganization Act of 1974*, as amended, the NRC evaluates nuclear material events and abnormal occurrences that have occurred at licensed facilities. As part of this responsibility, the NRC monitors and evaluates the resolution of all "significant" material events that may or will impact health and safety, including those that occur in Agreement States. As the LFA for nuclear material radiological emergencies, the NRC will also maintain contact with Agreement States during their response to specific events and will assist State and local authorities if requested. Such assistance may involve providing advice on actions to protect the public, as well as providing technical assistance and information.

[12]Through implementing procedures for the "Policy Statement on Adequacy and Compatibility of Agreement State Programs," the Commission imposed mandatory Agreement State reporting of material events.

Through the Integrated Materials Performance Evaluation Program (IMPEP), periodic reviews of the NRC regional materials programs and Agreement State materials programs are conducted. Under IMPEP, regional and Agreement State incident response activities are evaluated against common criteria and recommendations for improvement may be identified.

4.3.1 Effectiveness Review

The SA team conducted an effectiveness review for all significant response activities associated with the NRC's current event response practices and requirements for "significant" material events. The purpose of the effectiveness review was to identify response activities that critically support the response-related goals and objectives documented in Section 3.1. Noncritical activities are potential candidates for elimination. The assessment included a review of the effectiveness of the current material incident response practice.

The critical activities identified by the SA team were catalogued into the following 14 categories:

1. Receive event notification
2. Make event response decision
3. Conduct HQ virtual monitoring[13] - initial assessment
4. Conduct HQ virtual monitoring - expanded response mode
5. Provide administrative support
6. Deploy response team
7. Assess radiological conditions
8. Monitor (control/stabilize)
9. Assess safeguards (criminal acts)
10. Support response
11. Support media
12. Coordinate deployment of Federal response to scene
13. Provide liaison with State and Federal activities in the HQ area
14. Coordinate onscene Federal response
15. Coordinate with State and local officials

In these 15 response categories, the SA team identified 43 critical activities.

4.3.2 Efficiency Review

The SA team conducted an efficiency review to determine whether current nuclear material incident response processes and practices could be improved from the standpoint of efficiency (e.g., cost, quality, timeliness, and reliability). The team assessed whether nuclear material

[13]"Virtual monitoring" is a term used by the team to characterize the NRC materials incident response process. It reflects the fact that in most cases, NRC monitors material incidents with the staff dispersed but inter-connected via conference call (telephone bridge). The "virtual office" is in contrast to the incident response centers which are used to physically co-locate NRC responders monitoring power reactor incidents. The periodic conference calls sometimes may involve a relatively large number of HQ and regional staff. Calls may be held daily or several times per week.

incident response functions *"were being done the right way,"* or whether there were opportunities to perform these functions more efficiently.

In conducting the efficiency review, the SA team considered the critical activities performed by HQ and the regions. To do so, the SA team contacted HQ and regional incident response staff, regional ERCs, HQ office directors, RAs, and Agreement State regulators to elicit efficiency issues associated with current response processes and practices, as well as supporting readiness activities. The team also reviewed "case study" material incident response events which had occurred immediately prior to and during the assessment. Through these reviews and discussions, the SA team obtained insights on the costs, quality, timeliness, and reliability of the current response processes. In addition, the team examined source documents and procedural guidance for response to significant material incidents and emergencies, together with program lessons learned.

Overall, it was concluded that the current approach for nuclear material incident response supported the program goals and objectives identified in Section 3.1. Nevertheless, there were a number of cost, quality and timeliness issues that were identified. The following paragraphs provide selected issues that were identified in the efficiency review.

<u>Quality Considerations</u>

The Incident Response Program organization and staff were originally established for reactor event response functions and is more highly trained and knowledgeable of power reactor technology and power reactor events, than with nuclear material technology and events. Additionally, as described in Section 2.1, the NRC's incident response plan, including concept of operations was specifically developed for response to emergencies at power reactor facilities, although it is also considered applicable to fuel cycle facilities which have similar licensing requirements for emergency plans. Defense-in-depth (e.g., multiple barriers to the release of radioactive material, diverse and rebounded safety systems) and operator intervention generally results in a relatively slow accident progression for power reactor facilities, thereby enabling emergency responders to take measured but timely actions within the framework of modes of the NRC's concept of operations.

Although the potential consequences to the public are generally much less severe for material applications, the consequences to the individual or individuals involved in the incident can be high. In addition, incident sequences (e.g., lost or broken source capsules, contamination incidents, radiological releases) can progress relatively quickly. Therefore, the team found that the response plan, including response modes, was not developed in consideration of most effectively addressing the characteristics of significant nuclear material incidents. As a result the NRC's incident response process and practices that have evolved for material events are less formal and less structured than those for power reactor facilities. The NRC's response actions for most material events are generally adjusted and tailored on a case-by-case basis to the specific circumstances of the event or emergency.

Initiative**:** Establish a new, separate, effective, and efficient concept of operations framework and response process that is tailored to the special needs of materials incident response.

Formally document the process and establish implementing procedures. Provide training on the new concept of operations and implementing procedures.

***Initiative*:** Develop a formal materials incident response training program in connection with the new concept of operations and procedures tailored to materials incident response. Present the NRC's role in materials incident response and include a simulated materials incident response. Provide the training program to all staff members who are involved in materials event response, review, and analysis, including the HOC staff.

Additionally, the current RTM guidance for fuel cycle facility and material facility incidents states that "Emergency plans for material facilities are not yet standardized. The classification descriptions contained in the manual do not apply to facilities that do not have emergency plans." Since most material licensees do not have emergency plans, the NRC material event response is based on case-by-case assessment of the specific circumstances without the benefit of an event classification.

Initiative: Develop and document specific criteria on the basis of risk and safety significance to guide decision-making on the appropriate response to materials incidents.

Several Agreement States expressed concerns that HOOs do not understand nuclear material events as well as reactor events. Additionally, although procedures are in place for material events, there are weaknesses, such as a lack of specific criteria to guide decision-makers in evaluating the health and safety risks of material events. Additionally, there is no NRC responder training specifically designed for material incident response and the few material exercises that the NRC staff has participated in were conducted by other Federal agencies. Incident Response Program office management recognizes that the nuclear materials incident response program area has not been developed and implemented as fully and as formally as the power reactor incident response program area. Finally, at the time of the assessment no Incident Response Program office staff member was specifically assigned to overall coordination responsibility for material incident response program needs such as training, exercises, and procedure development.

Initiative: Provide enhanced materials technology training for HOOs for receipt and assessment of material event notifications.

Initiative: Consider establishing a nuclear materials incident response coordinator in the Incident Response Program office.

The team also found that in "responding" to significant material events, staff activities can involve incident *investigation* matters. Conducting investigation activities to understand the potential extent of the ongoing health and safety threat is often necessary to ensure that the response is properly scoped. However, investigation activities are not always critical to incident *response* goals and objectives to mitigate the immediate threat to health and safety. Once the extent of the hazard is known, pursuing investigation activities before mitigating the hazard may be inappropriate. In such cases the quality and timeliness of the response activities could be affected by the investigation efforts.

At the suggestion of AEOD management, NMSS staff members use the HOC facilities, including the dedicated phone lines, for both incident response and incident investigation activities. In general, the team found that the immediate hazard for most material events is terminated or transferred to the appropriate responding agency relatively quickly, with health and safety risks usually terminated within a few hours or less. Therefore, the NRC staff often finds itself in a situation of monitoring NRC licensee followup activities or Agreement State followup activities (e.g., incident *investigation)* rather than monitoring NRC licensee or Agreement State incident *response* actions during conditions involving immediate public health and safety. However, NRC staff may not always fully recognize that the actual or potential incident response situation has been terminated and, therefore, the actions that are being taken are other than emergency response (e.g., incident investigation or incident investigation monitoring).

Initiative: For reported materials events, responders should seek to determine as soon as possible if an actual, potential, or perceived radiological health and/or safety risk is involved (for which an NRC incident response is required), or whether the radiological health and/or safety risk have been terminated such that an NRC followup response (e.g., incident investigation or incident investigation monitoring) may be indicated.

The team also concluded that there is a lack of clarity regarding the expected response role of NRC staff for a material incident occurring in an Agreement State. Under the agreement, the Agreement State regulatory agency has regulatory responsibility for monitoring licensee response activities and for carrying out appropriate State response actions. However, under the FRERP, as the LFA, and under its Agreement State oversight authority under the Act, NRC staff has questioned whether NRC may have, and should exercise, if necessary, a more substantive response role than only monitoring State response actions and offering assistance. The team found that cognizant NRC staff believes that this issue requires further analysis and clarification.

Initiative: Clearly define the expected response role of the NRC staff for a nuclear material incident that occurs in an Agreement State. The expected response role should be formally documented in connection with the final decisions on other material response initiatives.

<u>Cost Considerations</u>

Current implementation practices for response to significant material incidents and emergencies appear to involve significantly more HQ and regional resources than are needed to perform critical response activities. Given the health and safety risks involved, the current incident response practice for a significant material event involves the expenditure of more resources than for a significant power reactor event in normal mode.

About 12 significant material events occur each year. The initial assessment and expanded monitoring conference call discussions for significant materials events can involve as many as 10 to 20 HQ and regional managers and staff. Specialists with expert knowledge in specific material activities, devices, system procedures, or radioisotopes are often considered essential and are added to the conference call to assess the health and safety risk, and to help management in determining the appropriate response. In reviewing past events it appeared to the SA team that there may be some duplication and inefficiency in the number of HQ staff involved in HQ virtual monitoring for materials incidents. The higher than expected number of technical specialists or interested (i.e., non-responder or Commission assistant) parties who participate in conference call evaluations of the potential health and safety risk may stem in part from a lack of specific written guidance and criteria for material event response. A material technical specialist call list has been drafted in order to help quickly identify the specific experts who are needed for consultation on the relative significance of a given material event. However, the list has not been finalized and implemented, which may have contributed to the elevated number of staff members who were contacted to participate in significant materials event response.

The number of participants involved in materials incident response may be as large as it is, in part, because of the recent formation of a materials generic issues review group and panel to assess materials events for generic issues, followup actions, or abnormal occurrence (AO) reporting to Congress. As part of this effort, group members may participate in virtual monitoring conference calls for purposes other than response, such as when the Commission requests additional information on an on-going event being lead by another Federal agency. For Agreement State incidents, the OSP also participates to keep informed on the status of the incident and to provide additional technical support. Finally, NRC management and Commission staff interest to be kept informed of ongoing events has resulted in additional NRC staff participating in the virtual monitoring conference calls during the event response.

Initiative: Finalize and implement a call list of materials technical specialists and experts for consultation on the health and safety significance of materials events. Ensure that the call list is contained in the EO briefcase, and distributed to the EOs and HOOs. Limit *active* participation in incident response to those who needed to initially respond to the event. Clarify procedures to allow others interested in the event to participate in conference calls, but only as "observers."

The current NRC incident response practice for significant material events can be resource intensive and time consuming due to the dissimilarity of materials licensees as well as the complexity of issues as evidenced by the following two cases studies:

The team reviewed recent "virtual monitoring" (continuous followup through conference calls) for an event that involved the loss of 19 cesium-137 sources in March 1998. The team considered this event significant because it provided an example of a well coordinated NRC response to a material incident in an Agreement State and, the Agreement State staff expressed positive appreciation to the NRC staff. Since the event involved the possible theft of nuclear material, the FBI was contacted. The HOOs coordinated the virtual monitoring conference calls and gave status summary updates of the event to NRC management and staff. Press releases were issued by the State and the licensee. When the State requested assistance, the HQ incident response staff contacted the appropriate Federal agencies and coordinated a DOE aerial survey. The coordination among the HQ incident response staff, State and Federal agencies, and NRC management and staff were considered very good. Coordination through the HOC provided a timely response to the State's request for support and ensured an official record of the response. The summary updates provided timely status reports to NRC management and staff. However, the team found that during the conference calls with the State, as many as 10 to15 NRC staff, and management, and Commission assistant staff participated in the calls on the status of the response.

Recent virtual monitoring for a cobalt-60 contaminated steel event which occurred in June 1998 was also assessed in the effectiveness review. The event involved contaminated steel from Brazil that was found in Tennessee, Missouri, Mississippi, and Utah. The steel was found at processed steel distribution centers, scrap yards, and other facilities that are not licensed by the NRC. Under the FRERP, since the contaminated steel was not licensed by the NRC or an Agreement State, the EPA is the LFA (the EPA has the responsibility for any emergency at a facility not licensed, owned, or operated by a Federal agency or an Agreement State). Upon notification of the event from the State of Indiana, the region notified the EPA regional office the next day of the discovery. About 20 members of the NRC staff participated in this conference call. Radiation measurements were taken by EPA and Agreements States in the week that followed notification of the event and although EPA was the LFA, EPA continued to coordinate with NRC technical and Commission staff, as well as the Agreement States, to inform them of its findings. As a consequence, the NRC continued virtual monitoring over a period of 2 to 3 weeks, mainly because of Commission and Agreement State interest.

Initiative: Continue efforts to expeditiously refer to the EPA event reports for nuclear materials not licensed by the NRC, or an Agreement State, in accordance with the FRERP. Responder training (i.e., management as well as and both technical and Commission assistant staff) should include the NRC's responsibilities under the FRERP and clearly delineate NRC's role as an observer for event reports for nuclear material not licensed by the NRC or an Agreement State.

The number of material event notifications to the HOC has increased in the past few years, partly because of the changes in guidance to Agreement States on event reporting, and partly because of increased emphasis from program offices and the Commission. In 1995, there were 362 material events reported to the NRC by NRC licensees and Agreement States. In 1996 the number of reported events increased to 438 and in 1997 the number of reported events increased to 592. Additionally, each year, 200 to 300 non-reportable material events are voluntarily reported to the NRC. Voluntary reports are those that are just below the reporting threshold, precursor events that had a potential to result in health and safety consequences and, low risk events involving media interest. A brief preliminary review of the notifications received showed that many events are low in both risk and safety significance. Materials event notification requirements are specified in various parts of 10 CFR. A brief preliminary review of notification and reporting requirements indicated that they may not be commensurate with the associated risks and can be made more risk-informed. The large number of low-risk and low-safety-significant event notifications increases the workload on licensee response personnel in making reports, and adds to the HOO workload. The team noted that there were no risk-informed material event decision criteria to support HOO assessment and screening of reported material events so as to avoid the need to notify the NMSS EO and RDO for response decision-making for all material events. Although AEOD initially developed and has revised the event reporting guidance document for reactors (i.e., NUREG-1022), emphasis on event reporting guidance remains on reactors rather than for materials events. Consequently a companion document to NUREG-1022 to provide reporting guidance for materials events was not envisioned or developed by AEOD.

Initiative: Revise, as necessary, event notification and reporting requirements on the basis of the risk and safety significance. Evaluate the need to develop risk-informed material event criteria to assist the HOOs in screening material events for immediate health and safety significance.

Timeliness Considerations

For many materials events, the potential health and safety risks may be addressed within 1 to 2 hours or less. Often, the NRC receives notification after the consequences have been mitigated. Events may occasionally last for more than a few hours or days, such as contamination at a facility. In such cases, the situation often warrants representation by the regulator (NRC or Agreement State) at the licensed site. For example, a transportation event may involve stolen, lost, or damaged equipment or material, which may warrant an immediate response. In most cases, the local police, the State, and the licensee (if there is one) are the first responders involved in the actual response and monitoring of activities to control the event or condition, with the regulator monitoring the licensee's response. This type of event may involve coordination with other Federal agencies or the media. Some events may pose a potential for significant consequences to the public and the environment and would warrant the regulator sending a team of responders to the site. Even under these circumstances, by the time the NRC receives notification, the immediate threat to health and safety has often been contained or controlled by the licensee or the State.

The NRC seeks to be cognizant of such events, and its role is to support the State's response activities, and to provide assistance if requested. According to established NRC policy, for transportation events, the NRC is responsible for evaluating the investigative assessment provided by the State. This lessens the importance of early response team arrival. The policy for transportation events is discussed further in the next paragraph.

Other Efficiency Considerations

Reliance on State or Non-NRC Federal Responders

The SA team assessed opportunities to reduce the NRC's incident response roles and responsibilities by relying on other agencies, such as State regulatory agencies. In a 1984 policy statement entitled, "NRC Response to Accidents Occurring During the Transportation of Radioactive Material," *49 FR 12335,* March 29, 1984, refers to an MOU between the NRC and the U.S. Department of Transportation (DOT) assigning the NRC as lead agency for investigating the cause and preparing a report. The policy states that "The States have the primary responsibility for protecting health and safety of the citizens from public hazards. Recognition of the responsibilities for radiation hazards is reflected by the existence of an appropriately designated State agency chartered with the responsibility of responding to radiological emergencies." This clearly defines the State as the responder. However, while the team found that the NRC is already seeking and obtaining the support of the Agreement States and non-Agreement States in response to low-consequence transportation accidents, this was not occurring in all cases and additional reliance on the State response activities was possible. Some regional staff members were not fully aware of the MOU and policy statement.

Initiative: Ensure NRC reliance on States for response to transportation accidents in accordance with established NRC policy, "NRC Response to Accidents Occurring During the Transportation of Radioactive Material." Provide and discuss with the regional offices a copy of the NRC/DOT MOU and policy statement during an upcoming regional ERC workshop and/or regional training courses.

Internet Access for Material Events

The current guidance in OSP procedure SA-300 states that the Agreement State regulatory agency should notify the HOC of the occurrence of a significant material event reported to the regulatory agency by their licensee, within 24 hours of notification by their licensee. All material events reported to the HOC are entered into the event notification database and distribution channel, which results in the immediate availability of event information on the Internet via the NRC's external web site. At the public meeting on June 16, 1998, Agreement States expressed a concern regarding the need for immediate Internet access to limited preliminary information on events before the State has had an opportunity to conduct an assessment. Although an event may be reportable to the NRC within 24 hours, it may not involve an immediate threat to health and safety. Within the 24-hour time frame, the regulator can evaluate and assess the safety significance and circumstances in order to provide a more complete description of the event. The NRC's Internet event report and the regulators report would then contain enough information to provide a clear report to the media and public.

***Initiative*:** State regulators should follow the current 24-hour notification guidance specified in OSP procedure SA-300. However, in order to provide Agreement States sufficient time to collect and evaluate preliminary event information before public inquiries begin, Agreement State event notifications should be posted on the NRC's external web site no sooner than 24 hours after receipt by the HOC.

4.3.3 Incident Response Options

Table 4.3 summarizes the NRC's current staffing and response practices for significant material incidents involving immediate health and safety risks as well as three additional response options having the potential for improved resource efficiency. The three additional options were developed on the basis of the critical response activities that were identified by the team and the minimum staff resources required to implement those activities. To develop a comparison of the options, a general framework based on the concept of operations (i.e., response modes) for reactor facilities was utilized even though the concept of operations is not specifically tailored for significant material event response characteristics. The first column in Table 4.3 provides the option description. The second column provides alternative options for Response decision-making. The third column provides the response options for the monitoring phase of normal mode. Column 3 and column 4 are presented for completeness and address, respectively, standby and initial activation modes. However, they were not specifically analyzed by the SA team since no materials events have reached these modes. A description of each option, beginning with an option for response decision-making, is provided below.

Response Decision-Making:

Pursuant to reporting requirements and staff guidance, an NRC licensee or Agreement State notifies the HOC of a "significant" material event within 24 hours or less. The HOO takes the event notification. The HOO notifies the NMSS EO, the appropriate RDO, and IRD manger on-call of all significant events. (In contrast to reactor events, all material events are referred to the EO to determine health and safety significance, whether an NRC response is needed and the appropriate response action.) An initial assessment of the event is conducted to determine safety significance and the appropriate response.

As noted above, the second column in Table 4.3 provides alternative staffing approaches for response decision-making for nuclear material events. The current staffing practice for response decision-making is shown in Option 1. A streamlined (minimum) staffing approach proposed by the team is shown in Options 2, 3 and 4. The proposed approach would: reduce the number of HQ decision makers from as many as 12 to 2; reduce the number of regional decision makers from 3 to 2; and reduce the number of Incident Response Program office staff from 2 to 1. Overall, the staffing approach proposed by the team would reduce the number of individuals involved in nuclear material event response decision-making and activation process from as many as 15 to as few as 5 individuals.

Initiative: Streamline the response decision-making and activation processes to make them more timely and resource efficient.

<u>Option 1: Current Practice</u>

The first option (i.e., the first row in Table 4.3) presents the *current practice* in terms of both staffing levels and the current concept of operations[14]. It should be noted that the most common response mode for significant material events is the monitoring phase of normal mode. Annually about 12 material events are monitored in this mode. Only about 1 or 2 material events reach standby mode each year. No material event has ever reached a level above standby.

<u>Normal Mode</u>: By written procedure the region has the lead and HQ supports the regional lead. This is the current concept (which was developed for reactors and applied to material events). Generally, most material events are responded to in normal mode where the regional staff of the Division of Nuclear Material Safety (DNMS) or the Regional State Agreements Officer (RSAO) will assume responsibility for interacting with either the licensee and non-Agreement State or, staff of the Agreement State regulatory agency. The region will keep HQ staff informed of the current event status and prepare and issue a preliminary notification (PN) and PN updates. However, for very significant material events, HQ takes the lead during the monitoring phase of normal mode since the elevated safety significance of some material events may require additional HQ monitoring. In such cases the HQ staff monitors the response through conference telephone calls (designated “virtual monitoring” by the SA team) comprised of approximately 10-20 HQ managers and staff, 2-3 regional managers and staff and the licensee and/or State representatives. The region in coordination with HQ maintains direct contact with the State and licensee, (and the Agreement State for events that occur in an Agreement State). If requested by the licensee, or if agreed upon by the State, NRC may send a representative to the site to follow response activities of the NRC licensee or the State. NRC responder(s) will also assist in assessing the need for NRC assistance and ensuring that NRC assistance is made available, if requested.

<u>Standby Mode</u>: In this mode both the HOC and regional IRC are activated. HQ maintains the lead with the region supporting HQ. For those material events where the decision is made to respond on-site, a regional response team (RRT) will be sent from the region, usually

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[14]The concept of operations developed for power reactor facilities. The description for the “current practice” for materials event response is based on the NMSS emergency officer procedures for materials and fuel cycle facility events.

composed of 1-2 staff. The on-site team primarily monitors the licensee and/or State response. Any technical support provided in response to a request from a State is processed through HQ. All NRC evaluations and assessments are processed through NMSS.

Initial Activation Mode[15]: In this mode HQ continues the lead, with the regional base team supporting HQ. The region dispatches a formal initial site team, which is en route to the site.

Expanded Activation Mode[16]: In this mode the Executive Team Director transfers specific authorization and authority to the initial site team's Director of Site Operations (DSO). The DSO assumes the lead for the NRC's response and coordinates with other Federal agencies at the scene. HQ and the regional base team support the initial site team.

Full Federal Activation Mode: Additional responders supplement the initial site team to ensure that all liaisons are in place to coordinate with other Federal agencies responding to the scene of the emergency .

Option 2: Current Concept with Minimum Staffing

The second option (i.e., the second row in Table 4.3) is the current concept of operations but with the *minimum staffing* needed to perform all of the activities critical to a successful response. In this option, as in Option 1, HQ would remain in the lead during the monitoring phase of normal mode and standby mode. HQ would also have the lead during initial activation, if the event warranted that level of response. During normal mode the region would maintain direct contact with the licensee or State and would provide periodic summaries to HQ on the event and event response.

The HQ team monitoring the response (designated "virtual monitoring" by the team) would be reduced from the current practice of approximately 10-20 HQ managers and staff and 2-3 regional managers and staff to 7 managers and staff. This results primarily from streamlining the management structure and information flow. The current HQ monitoring team would be replaced by a small expert team of 4-5 responders. HQ management and staff would be kept informed of the status of the event through electronic status summary reports issued by the HOC.

The staffing levels and functions of the RRT are virtually the same. To eliminate confusion and duplication of effort, the region continues to maintain direct contact with the responder.

Option 3: Region Lead with Minimum Staffing

For the third option (i.e., the third row in Table 4.3), *the region has the lead in the monitoring phase of normal, standby, and initial activation modes*. Additionally the regional staff would

[15] No material event has yet reached this or higher mode.

[16] Expanded Activation and Full Federal Activation Modes are specifically applicable to reactor and FCF events. They have been included in the materials concept of operations for completeness.

establish and deploy the regional response team. Monitoring at the regional office would include one manager and one technical staff member. The minimum staffing at the regional office is the same as Option 2. The HOC staff would provide status summary report updates on the event. HQ would support the region for those functional areas that are best performed at HQ. The staffing levels and functions of regional response team are virtually the same.

<u>Option 4: Other Agency or State Lead</u>

For the fourth option (i.e., the fourth row of Table 4.3), the NRC would refer the material event or emergency response lead to a State or another Federal agency, (e.g. the Environmental Protection Agency). NRC would offer technical support as needed.

4.3.4 Analysis of Incident Response Options

The following analysis is for the monitoring phase of normal mode (i.e., the third column in Table 4.3). Each option assumes that the involved responders have received the required incident response training and are fully qualified to perform their response duties. As shown in Table 4.3 each of the three additional options involve the same 5 staff member approach to response decision-making.

<u>Option 1: Current Practice</u>

Under the current practice described above, the “normal” virtual monitoring (telephone conferences) can involve as many as 20 or more NRC managers and staff. Given the safety significance and risk involved, the resources expended in responding to significant materials events are considerably more extensive than for power reactor events under similar monitoring modes. The current practice demonstrates the following inefficiencies: (1) a significant number of NRC managers and staff are involved in response activities during this mode, (2) the pursuit of parallel incident investigation activities during a response appears to increase the number of participants in the response, (3) telephone calls to responders from HQ and the region can result in duplication of efforts, and (4) some prescheduled virtual conference calls do not involve substantial new information. The Team concluded that the aggregate time spent by management and staff participants in response activities can be reduced.

<u>Option 2: Current Concept of Operations with Minimum Staffing</u>

For this option, the number of participants in monitoring phase of normal mode (i.e., normal virtual monitoring) would be reduced from 10 to 20 managers and staff to a total of 7 managers and staff. Other parties with interest in response, investigation or inspection issues would either receive periodic summary updates or would *listen* (only) to the response-related discussions. As in Option 1, HQ would have direct communication links to other resources (e.g., Federal agencies). The region, which has the most knowledge of the material licensee operations and NRC licensee or State responders) would continue to have the responsibility for direct contact with the licensee or State responders and would provide periodic summaries to HQ when new substantive information on the event was received. Instead of prescheduled conference calls, the region would establish conference calls when significant new information was available. Fewer but better trained responders would be involved and incident investigation activities would be pursued separately from the response activities.

Table 4.3 Staffing for Alternative Concepts of Operation by Response Modes - Materials

#	Option Description	Response Decision Making (Normal)	Monitoring Phase of Normal	Standby[1]	Initial Activation[2]
	SIGNIFICANT MATERIAL EVENTS RESPONSE MODES				
1	HQ Leads Monitoring Current Practice (Staffing varies)	NMSS (5+3)† AEOD (1+1) OSP (1+1) Region (1+2) State (N/A)	OEDO (0+1) NMSS (5+3) AEOD (1+1) OSP (1+1) Region (1+2) OPA (0+1) State/Licensee (N/A)	HQ BT	HQ BT
			RRT‡ Departs (1 to 2)	RRT On-site	ST Departs
	Total Staff	10 to15	10 to 20	Not Estimated	Not Estimated
2	HQ Leads Monitoring Minimum Staffing	NMSS (1+1) AEOD (1+0) Region (1+1) State (N/A)	NMSS (1+1) AEOD (1+0) OSP (1+0) Region (1+1) State/Licensee (N/A)	HQ BT	HQ BT
			RRT Departs (1to2)	RRT On-Site (1 to 2)	ST Departs
	Total Staff	5	7	Not Estimated	Not Estimated
3	Region Leads Monitoring Minimum Staffing	NMSS (1+1) AEOD (1+0) Region (1+1) State (N/A)	Region (1+1) HQ (0)[3]	HQ BT	HQ BT
			RRT Departs (1to2)	RRT On-Site	ST Departs
	Total Staff	5	2	Not Estimated	Not Estimated
4	Other Agency or State Leads Monitoring Minimum Staff	NMSS (1+1) AEOD (1+0) OSP (1+0) Region (1+0)	N/A[4]	N/A	N/A
	Total Staff	5	N/A	N/A	N/A

† (5+3) = 5 managers + 3 technical staff
‡ Regional Response Team – Most materials events occur on an immediate real-time basis. The initial response team would be expected to arrive at the site after the event or condition has been stabilized or during the licensee's or State stabilization activities. Therefore, the primary function of the initial response team would be to monitor the licensee or State actions to stabilize the event and prevent additional risk to health and safety.
[1] This mode is provided for completeness but was not evaluated by the team.
[2] This mode is provided for completeness but was not evaluated by the team. No material events have reached this mode.
[3] HQ receives summary update reports on the incident from the region but does not actively participate as responders.
[4] HQ turnover lead to other Federal Agency or State. HQ provides support as requested.

Option 3: Regional Lead with Minimum Staffing

For this option, the region would have the lead with HQ support in monitoring phase of normal mode. This option involves a total two regional participants (a manager and a technical specialist). The region would keep HQ informed of the status of the event and the HOC would provide summary report updates when substantive new information on the event was received from the region. Telephone conference calls would be conducted only for significant new information on the event. Although this option involves the fewest NRC resources, the region does not have the communication resources and expertise established at HQ. The NRC received considerable criticism for insufficient communication capabilities during TMI. Monitoring with this option would be expected to have about the same level of quality and response timeliness as Option 2.

Option 4: Other Federal or State Agency Leads the Response

For this option, the NRC would refer the materials event or emergency to an Agreement State or other Federal agency, such as the EPA. The NRC would then provide technical support, as necessary, to the lead agency. The feasibility of this option is constrained by the NRC's statutory responsibilities and the support from the States and other Federal agencies. As discussed earlier, local officials and police are already the first responders for transportation events. The NRC also relies on local officials as the first responders for some material events. The potential exists under this option for minor materials events. However, formalizing this process could take years to obtain an agreement with each State. Although this option may offer the most savings in NRC resources, the quality of responders varies greatly.

Comparative Analysis of Alternative Incident Response Options

For this analysis, the SA team contacted several staff members with extensive knowledge and experience in the NRC's Incident Response Program to obtain their perspectives and insights on the alternative response options. The majority of the "experts" supported Option 2 (i.e., minimum staffing). The experts generally agreed that fewer but better trained responders would increase efficiency and effectiveness. Most of the experts also felt that it is important to provide the responders with training that is specifically designed for materials incident response. A few supported the current process with no change. One expert supported Option 3 (i.e., full region lead with support from HQ). Most of the experts indicated that Option 4 (with another agency leading the response) would require costly training for the States, which are not familiar with the FRERP, including coordination with other Federal agencies, the Congress, and the White House.

Initiative: Implement a trial program to assess the acceptability of minimum staffing within the current practice (Option 2). On the basis of the results of the trial program, implement the minimum staffing approach on a permanent basis, as appropriate.

5.0 INCIDENT RESPONSE PROGRAM READINESS ACTIVITIES

The SA team conducted a review to identify where current response preparation (i.e., readiness) activities and processes might be improved from the standpoint of efficiency (e.g., cost, quality, timeliness, reliability, etc.). That is, the team assessed whether readiness functions and activities “were being done the right way,” or whether opportunities existed to perform these functions and activities more efficiently. In conducting the efficiency review, the SA team considered the incident response preparation activities performed by HQ and regional response program staff, as identified in Section 2.2.

5.1 Program Development And Response Coordination

The SA team conducted an assessment of program development and response coordination activities to identify opportunities for improved efficiency and effectiveness. In this process, the team reviewed budgeted and unbudgeted resources and interviewed responders from the NRC, States, and other Federal agencies. In addition, the team examined the delineation of authority, NRC-wide incident response plans, response organizations and personnel recruitment, maintenance and development of implementing procedures, response tool development, and program development and implementation, as described in the following subsections.

Delineation of Authority

MD 8.2, “NRC Incident Response Program” states that the director of AEOD, has the responsibility to ensure that HQ and the regional offices have effective response capabilities. MD 8.2 further states that NRR, NMSS, and OSP support the response program by providing personnel to serve as team members during a response and by participating in training and exercises. As stated in Handbook 8.2, overall responsibility for the response program is assigned to the Incident Response Program office . The Handbook further states the following:

> The Incident Response Division, AEOD develops the policies, plans, requirements and procedures necessary to ensure the NRC’s response to radiological incidents is cohesive and consistent across the agencies response organizations.

NUREG-0325, “U.S. Nuclear Regulatory Commission Organization Charts and Functional Statements,” Rev. 22, dated November 1997, includes functional statements for AEOD, NRR, and OSP that are consistent with MD 8.2. However, the functional statement for NMSS is as follows:

> [NMSS]...directs NRC contingency planning and emergency response operations dealing with accidents, events, incidents, threats, thefts, or radiological sabotage relating to licensed activities under its responsibility.

Therefore, MD 8.2 and NUREG-0325 are inconsistent with respect to organizational responsibility for nuclear material Incident Response Program development. Accordingly, compared to reactor Incident Response Program development, NMSS takes a more independent and active leadership role and responsibility for Incident Response Program development activities associated with nuclear materials and FCFs. This situation may have evolved, in part, as a result of the historical roots and emphasis that the Incident Response Program office continues to place on reactor incident response functions. Although nuclear materials technology expertise resides in NMSS, and reactor technology expertise resides in NRR, the expertise and leadership regarding incident response requirements and processes resides in AEOD, the Incident Response Program office. Therefore, optimum efficiency and effectiveness in nuclear materials response program development and implementation or reactor response program development and implementation requires close interaction and coordination between the program office responsible for incident response and the major program offices.

In part, because of a lack of dedicated staff within the Incident Response Program office to coordinate with NMSS on Incident Response Program development and implementation activities and, a lack of clarity of organizational roles and responsibilities, there has been less than optimum response program development in some cases. In this regard NMSS has developed technical tools such as RTM-96 supplements for GDPs. The departure in 1997 of the AEOD staff member, who was responsible for coordinating NMSS response activities with AEOD, has weakened the efficiency of interoffice response development and coordination between the two offices. In this regard, as NRC oversight of DOE facilities expands, the clarity in office roles and responsibilities, coupled with close interoffice coordination, will be needed to ensure efficient and effective development of the incident response procedures for the diverse spectrum of DOE facilities.

Initiative*:* Ensure clarity and consistency in the NRC's organizational and program documents with respect to office roles and responsibilities for Incident Response Program development. Re-establish a nuclear materials and FCF incident response coordinator in AEOD (i.e., the Incident Response Program office). Emphasize improving coordination and effectiveness of incident response activities between NMSS and the Incident Response Program office.

Initiative: All documents that are developed outside of the Incident Response Program office and which provide formal policy or procedural guidance on the incident response function should be coordinated with and concurred upon by the Incident Response Program office.

NRC-Wide Incident Response Plans

The NRC Incident Response Program is designed to meet the agency's responsibilities as specified in the AEA, various Federal plans, and numerous agreements. The NRC staff has ensured that the NRC response program focuses on either activities that the NRC is best qualified to perform (e.g., accident assessment) or activities that are explicitly assigned to the NRC (e.g., coordination of the total Federal response).

As directed by PL 96-295, the NRC published NUREG-0728, "The Incident Response Plan," which was last revised in 1987. The plan was written to address nuclear power plant emergencies, but is also valid for some FCF emergencies. The plan assigns responsibilities and establishes selected response concepts such as the response modes described in Section 2.1. Since 1987, significant changes have occurred in the response plans of other Federal agencies and in NRC's responsibilities. As part of the RCM, AEOD published a revised detailed concept of operations and organization charts with functional statements for the response to a power reactor emergency or FCF emergency. The concept of operations was developed in cooperation with the regions and provides the reference basis for further nuclear power plant and fuel cycle facility Incident Response Program development. As described in Section 4.3, the plan and concept of operations, although applicable, are not well suited for nuclear materials or transportation incidents.

Initiative*:* Revise NUREG-0728 and the supporting concept of operation to (1) most effectively address responses to the full spectrum of incidents for which the NRC may be the LFA (e.g., nuclear materials, transportation, research reactor, and spent fuel), (2) address any changes to the power reactor concept of operations resulting from decisions on initiatives in this SA, (3) incorporate recent revisions in other Federal plans and agreements, and (4) periodically review and update NUREG-0728, as needed.

Incident Response Program Plan

Because incident response is an NRC-wide program, resources including response team members are drawn from throughout the NRC. However, in many cases, support for the response program is not included in position descriptions or individual performance plans. Moreover, not all offices explicitly include all Incident Response Program support activities in their annual operating plans and budgets. In addition, there is no integrated NRC-wide program plan that compiles and assigns all significant program development and implementation activities for the Incident Response Program. Occasionally, this has resulted in difficulty in obtaining support for responder participation in training and exercises, or assistance in response tool development or procedure development.

Initiative*:* Develop and maintain an integrated NRC-wide plan for the NRC's Incident Response Program. Annual office-level operating plans should document planned development and maintenance activities, accomplishments and resources in support of, and consistent with, the NRC's Incident Response Program Plan and MD 8.2.

Implementing Procedure Maintenance and Development

The original concept of operations and implementing procedures were developed by a task group which fully coordinated the interfaces between functional areas. Detailed procedures were developed and published for each response team position identified in the concept of operations. (This includes procedures for HQ and the regions.) The procedures have been standardized across regions.

Procedures within the HOC are revised and updated on a routine basis by the Incident Response Program office response team coordinators and the HOOs in response to lessons learned during exercises and response to real events. Procedures have also been revised on the basis of requests from offices or individuals. Recently, however, procedure revisions have not always completely evaluated by the Incident Response Program office staff and response teams for the interdependency among procedures, resulting in procedural conflicts. This has occurred in part because routine meetings are no longer being held among coordinators and HOOs who reviewed procedural changes for complete and consistent integration. A decline in resources has also resulted in the discontinuation of periodic audits of procedures. Finally, as noted in Section 4.3.2, a different concept of operations appears warranted for materials, transportation, research reactor, and fuel storage incident response. Development and implementation of any new concepts would also require the development of supporting implementing procedures.

Initiative*:* Develop implementing procedures for the concept of operations and organization charts developed for the response to materials, transportation, research reactor, and fuel storage incidents.

Initiative*:* Ensure that changes to implementing procedures are validated, verified, and fully integrated before their implementation through reviews conducted among the regions, response teams, and response coordinators.

Incident Response Program Guidance and Analytical Tool Development and Maintenance

Responder experience shows that, to be effective, technical assessment tools must be relatively simple and easy to use, as well as quick to implement. With the assistance and support of response team members and other HQ offices, AEOD developed response tools to meet these needs. Examples of analytical tools and guidance include the Response Technical Manual (RTM), RCM, and RASCAL. The practice has been to publish this material to facilitate good coordination and peer review. The FRMAC manual is used to assess environmental data following a release. However, since the response tools were developed, the challenge and workload associated with maintaining the tools have increased. To stay current, response tools must be periodically revised and updated to address significant lessons learned from U.S. and foreign experience and changes in Federal guidance. The anticipated need to develop tools for DOE facility incident response will present additional challenges. The facilities involve a wide range of fuel cycle and other radio chemical processes. This could necessitate the development of analytical tools (as well as response procedures and training) to ensure that the NRC effectively implements its LFA responsibilities.

The HQ response program staff and budget have declined over the past several years, while the program maintenance workload and Federal coordination workload have increased. This has resulted in some functional areas not being adequately covered. For example, staff losses have weakened coordination and support for nuclear materials response readiness activities such as maintaining and exercising FCF response teams.

Initiative*:* As part of an overall Incident Response Program plan, include provision for periodic review and update of NRC response assessment tools and guidance, as well as support for interagency response procedure development. Ensure that the significant incident response lessons from major international and national events are incorporated into the NRC's Incident Response Program. This might be accomplished by requesting IAEA for a fellow to work at NRC for 3 to 6 months. Ensure that resources support Incident Response Program maintenance and development workload.

5.2 NRC Responder Training and Exercises

The SA team conducted an assessment of training and exercise activities to identify opportunities for improved efficiency and effectiveness. In that process, the team reviewed budgeted and unbudgeted resources and contacted responders from the NRC, States, and other Federal agencies. The team also performed a scoping analysis to estimate the FTE resources that would be needed for responder training and exercises to maintain the qualifications of the core staff needed to perform the critical response activities. Additionally, the SA team consulted the professional staff of AEOD's Technical Training Division (TTD) and the FEMA Emergency Management Institute (EMI). EMI has considerable experience in reaching large numbers of students in many different locations.

NRC Responder Training

NRC responder training is essential for an effective Incident Response Program. The goal of the NRC's responder training program is to ensure that NRC responders are prepared to perform their assigned response duties in an effective manner. In October 1995, AEOD issued revised responder training guidance in the form of a list of courses required for each response position. The revised training program guidance was promulgated in response to regional requests to reduce the "training burden" on regional inspectors by reducing the time responders spend attending required training courses. Required training had been especially burdensome on responders having several different response positions. The revised training requirements were developed on the basis of a consensus of the HQ and regional staffs, tempered by an understanding of the amount of time response team members would be allowed to attend response training. However, the training program requirements were not developed through a rigorous analysis of what training was needed to ensure responder proficiency. A rigorous job/task analysis may not be needed to develop an adequate response training program. However, an analysis of expert opinion regarding the training that would be needed for a responder to proficiently perform assigned critical activities has not been conducted for each response position. Training program requirements developed on the basis of trainee availability (rather than analyzed training needs) is inconsistent with best practices.

The NRC's incident response training program is not fully documented, in part due to insufficient resources. Training modules established on the basis of student objectives supported by student and instructor notes are not maintained. In 1988, a training program with student objectives and supporting text was published in NUREG-1210, "NRC Severe Reactor Accident Incident Response Training Manual." This manual was used by States and licensees to present training on the NRC's Incident Response Program. This manual has not been updated and is no longer used. The lack of up-to-date formal documentation of the program does not support institutional knowledge and lessons learned to be systematically captured and reliably passed on to the responders. It also hampers the ability of the States, licensees, other Federal agencies, and staff members to give consistent training without support of the NRC response staff.

The training program guidance for all response personnel includes general response training (GRT), team position training, and drill participation every other year. The GRT is for reactor, FCF and materials response team members. Specialized training on the RTM, dose projection code (RASCAL), and FRMAC is also recommended for some positions. The program guidance calls for a typical NRC responder to attend about 7 hours of training every 2 years. Following initial GRT, candidate HOC responders are observed and evaluated under exercise conditions by the response coordinators from the Incident Response Program office and the NRC response team managers. With successful performance in exercises, candidate responders are added to the roster of qualified responders. GRT and position training are given as needed to as few as 1 to as many as 20 to 25 individuals together. Over the past 2 years, multiple presentations of GRT have been conducted at HQ for EOs, project managers, ET members, FCF Safety Team members, FCF PMT members, and other HQ responders. Team position training is often presented on a one-on-one basis. A contractor provides well-documented training on the use of RASCAL. At the request of the regions, and given the inability of NRR personnel to support attendance at a 1½- to 2-day course, training on the full RTM is no longer required. Additionally, for several years, there has not been training on the RTM fuel cycle facility and materials analysis tools. As an alternative, an integrated team training course concept has been developed and implemented by the Incident Response Program office staff at HQ and in the regional offices. The integrated training provides for a challenging drill of the RST and PMT members in the application of the RTM during a severe accident scenario. However, the RTM theory has not been extensively provided in connection with the integrated team training approach since 1996.

Several responders felt that significant weaknesses existed in the current training program, such as a lack of training for response management on the overall concepts of operations and limited training on HOC equipment and operating procedures. For the latter, response coordinators have sought to become familiar with the equipment and procedures of other response coordinators. Additional specialized training courses have been offered as needed. In the past 2 years, new courses have been offered on severe accident guidelines, crisis communication, and the use of specialized computer codes for projecting consequences from chemical releases. Response personnel felt that they needed such specialized training to be adequately prepared to perform response functions. However, the training has not been incorporated as training requirements. Also, under OSHA requirements, specialized training (HAZWOPER) is required for personnel who must enter a hazardous environment, and the potential need for this training has been recognized. For NRC responders, the Incident Response Program manager is responsible for determining which response positions (if any) should have the OSHA training. However, these determinations have not yet been made.

For HQ, required response courses are offered on a periodic basis, and appropriate responders are invited. However, attendance at the HQ training has been described as disappointing in part, due to a lack of sufficient advance notice or other higher priority duties. Therefore, additional training sessions have been be needed on occasion to train all of the responders in a given position. Repeat sessions are necessary when response personnel do not attend initial training sessions. Currently there is no requirement for responders to complete required training to remain on the HQ qualified responder list. When responders miss required courses, the Incident Response Program office confers with the involved individuals to assess their continued availability to serve as responders, to attend future training, or to be removed from the response call lists. Training attendance weaknesses have resulted in responder performance problems during responses to recent incidents.

The Incident Response Program office does not have a centralized database to allow response training attendance records to be reviewed to verify that HQ response personnel have (or have not) received required training. Instead, for HQ responders, successful participation in a full-participation exercise substitutes for training and is used to validate an individual's response qualification. However, substitution of exercises for instruction is inconsistent with accepted norms and good practices for training and qualification for safety-related activities. Further, there are no formal acceptance standards or criteria for "successful" participation in exercises. Therefore successful participation in an exercise does not ensure that the responder is capable of performing all assigned response tasks.

In general, the regions track attendance at response training courses to ensure that regional response personnel receive the required training. However, since response training and exercises do not involve established performance standards, evaluation of the ability of responders to perform their assigned tasks is subjective. Instead, the performance of responders is informally evaluated during exercises by the team coordinators. As noted above, responder performance weaknesses have been observed during responses to recent incidents. Also, team performance during exercises is not independently assessed.

As noted in Section 2.3, the regions and HQ expend about 5.1 unbudgeted FTEs on reactor response exercises. On average, a typical responder participates in 10 to 30 hours of training or exercise play per year. This disparity across responders in the total hours spent in training and exercises principally results from the differences in the amount of hours which individual responders spend in exercise participation.

Most recently, HQ has participated in about four full-participation reactor exercises a year and the regions between one (Region I) and four (Region IV) exercises a year. Additionally, since 1995 there has been one FCF exercise each year (1 full exercise and 3 table top exercises). A periodicity guideline for responder training and exercise participation to maintain responder proficiency standards for infrequently performed tasks has not been established and documented.

The SA team estimated that about 16 hours of training and exercises would be needed each year to ensure that NRC responders in the reactor, FCF and materials areas are proficient in performing their assigned critical response tasks. This assumes that participation in an exercise or drill would be required every 2 years. However, 16 hours does not represent a rigorously established basis for NRC responder training.

A senior training specialist from the TTD stated that the response training requirements should be established through an abbreviated but formal process consistent with established methods. This treatment could be used to determine annual training requirements, the appropriate frequency of training and the appropriate frequency of participation in exercises. Although such an analysis is beyond the scope of the SA, expertise is available at the TTD to conduct such an assessment. Finally, the training specialist recommended that the response training program should be formally established to meet common standards, as follows: (1) identify the training and qualifications required to perform each response position, (2) develop detailed training materials, (3)evaluate the trainee and training process to ensure that the training provided is effective, (4) periodically revise the training to incorporate lessons learned, and (5) periodically review training effectiveness to verify that NRC response personnel meet the established training standards.

NRC Responder Participation in Exercises

Exercises are conducted to provide integrated team training under realistic conditions and to evaluate the NRC's response capability. At the time of the SA the HOC exercise program involved the following output metrics: (1) participate in a reactor, FCF or materials exercise with each region annually, (2) conduct an exercise with each State and nuclear utility every 5 years, (3) conduct an exercise at some level with the State during each ingestion exercise, and (4) conduct a materials or FCF exercise annually.

To meet the established output measures, HOC team members may participate in one or more of the 4 or 5 full-scale exercises each year. Also, exercise participation varies considerably from region to region (e.g., in 1998, one in Region I, two in Regions II and III, and four in Region IV). However, these quantitative output measures have not been rigorously founded on the periodicity of exercises necessary to maintain NRC responder proficiency. The NRC has not conducted exercises for materials events although response staff have participated in a materials exercise conducted by another Federal agency.

The power reactor (and FCF) exercise participation schedule has been driven in part by the objective to have licensees and States exercise their response coordination activities on a regular basis with NRC response teams. Regular participation by the States has been viewed by the States and the staff as an effective means of providing training to State responders on the NRC's incident response roles and responsibilities. However, some State responders have indicated to the Incident Response Program office staff that they do not recall personally ever having participated in an exercise with the NRC. This appears to result from the relative infrequency with which the NRC exercises with a given State and power reactor facility, coupled with the relatively high "turnover rate" of State responders. Also, relatively few NRC response positions interface with State or licensee responders during an exercise. Therefore, full-participation exercises appear to be an ineffective and resource-intensive approach to training licensee or State response personnel on NRC response functions and activities and, interfacing with NRC responders.

The NRC generally participates in nuclear power plant exercises that are designed to meet licensee and State licensing requirements rather than the training and qualification needs of NRC responders. The exercises generally lead to core melt and a major release on a fairly predictable time scale and focus on plant and local response considerations. As such, full-participation exercises do not generally provide an optimum training or evaluation basis for many of the NRC's response functions. This is particularly true for the non-radiological and the long-term aspects of a response.

As the LFA, the NRC is responsible for leading the total Federal response to a radiological emergency including the coordination of non-radiological assistance (e.g., financial, medical) provided by other Federal agencies. The NRC also has the responsibility to keep the media, the Congress, the White House, State officials, and possibly officials from other countries (e.g., Canada) informed. The NRC is also responsible for coordinating with the heads of other Federal agencies (such as EPA, USDA, FEMA, or DOE) or possibly a Presidentially-appointed lead Federal official. Most exercises generally do not involve a high fidelity in simulating these interfaces. Therefore, exercises can suggest that the primary focus for NRC response management (ET) is on technical assessment, while it should be expected that the primary demand would be on interfacing with the public (media), the States, and the heads of other Federal agencies. Therefore, the Chairman's focus during an emergency would be on attending to external stakeholder information demands rather than technical assessment details. In this regard, until recently, exercises often provided less than optimum consideration of these important elements and thereby had the potential to create a false sense of confidence in the NRC's overall response readiness. Recent full participation exercises have sought to provide greater emphasis in this important area.

A primary objective of licensee exercises is to test the ability of offsite officials to implement their emergency plans. Licensee exercises are not specifically designed to evaluate the ability of NRC responders to independently assess plant and radiological conditions. At one time, the NRC had conducted drills utilizing the nuclear plant analyzer (NPA) developed by the Idaho National Engineering Laboratory (INEL) to challenge and evaluate the NRC's reactor technical assessment capabilities. These drills were designed to provide realistic scenarios that tested the RST's technical capability to evaluate licensee mitigation strategies and were well-received by the staff. In some cases, these exercises involved providing data to drive the ERDS. Drills with the NPA continued for several years, but were discontinued as a result of budget reductions.

As a continuation of the NPA drill format, AEOD developed and successfully conducted a new training format with the technical assistance of the TTD. The "integrated response team training" format utilizes state-of-the-art nuclear plant simulations with challenging but realistic scenarios with the dual objectives of maintaining the NRC's analysis expertise and further involving the NRC's interface and coordination functions in a realistic training/exercise scenario. However, this training has not been formally integrated into the published training program and analogous drills have not been performed for FCFs.

It has been suggested that reactor exercises should include higher probability, low consequence incidents in addition to high consequence, very low probability accidents. In this regard, the NRC periodically responds to actual lower-consequence events. For example, the NRC entered standby mode for the alert at Davis-Besse on June 24, 1998 which resulted from a loss of offsite power caused by severe storm conditions. Although lessons were learned, the overall NRC response was considered a success by NRC management and those outside the NRC (e.g., the media, international interfaces, and the States). Additionally, the response to postulated core damage events places the greatest demands on the NRC's response capability. Therefore, it does not appear that an exercise of low consequence events is an efficient use of the NRC's response resources.

NRC exercises emphasize the early phase of a serious reactor accident. The NRC has not conducted exercises involving many potentially serious events involving materials (e.g., ruptured source with widespread contamination), transportation, later phases of a reactor accident, or terrorism. Many of these events can have unique characteristics (e.g., interface with the FBI or several States at one time). The last full scale exercise of the full Federal response to a radiological emergency with the NRC as LFA was the second full Federal field exercise (FFE-2) in 1987. There have been considerable changes in the national level response plans and procedures in the last 10 years. These revised Federal plans and procedures have never been tested or evaluated during an exercise.

Finally, the FBI, FEMA, and EPA occasionally conduct exercises with States involving NRC licensees that have not been fully coordinated with the NRC. Such exercises result in lost opportunities for efficiencies.

Initiative: Conduct an analysis to provide a firm basis for establishing training requirements for NRC response functions and activities. The assessment should employ recognized methods to determine the type and frequency of response courses and exercises needed to adequately maintain responder proficiency.   The TTD should provide technical assistance for the analysis.

Initiative: Establish and implement a formal NRC responder training program on the basis of the analyzed training needs. The program should include (1) identification of the training and qualifications required to perform each response position, (2) development and implementation of a training program and formally documented training materials to meet the identified training needs, (3) an evaluation of the training provided to ensure that it is effective, (4) periodic revision to incorporate lessons learned, and (5) periodic review to verify that NRC response personnel meet established training requirements. This program should be developed with the assistance of TTD.

Initiative: Establish an NRC-wide policy that attendance at required annual responder training is mandatory. Establish a training schedule that meets the training requirements and accommodates routine scheduling issues faced by NRC staff. Scheduled training courses should reach all NRC responders with the fewest number of scheduled classes. Responders should be notified of the scheduled response training courses well in advance via the NRC's e-mail system.

Initiative: Increase the use of drills, table tops, or other methods to provide team and integrated training as resources allow. Full-scale exercises should primarily be used to test the integrated NRC response system and to train the highest levels of response management.

Initiative: Continue current efforts to increase the realism of the NRC's response exercises, especially with regard to external interaction with the media, Congress, the White House, and heads of other Federal agencies by the Chairman, DSO, and other NRC spokespersons.

Initiative: Base the periodicity of full participation exercises on maintaining NRC responder proficiency, rather than on maintaining State responder knowledge of NRC response functions and activities. Periodically exercise all phases of the NRC response. Have exercises evaluated independently (i.e., by an outside organization). Formally track the significant lessons learned from exercises to final resolution.

Initiative: Develop a multi-year exercise program with other Federal and State (e.g., for materials exercises) agencies. Exercise all types of emergencies that have the potential for serious health and safety consequences. Exercises should include materials events, FCF events, transportation events, full Federal response under the FRERP and FRP, and terrorist events and chemical releases requiring interface with the FBI and EPA, respectively.

Initiative: Evaluate the increased use of the TTD simulators, nuclear power plant analyzers, and other methods to produce technically accurate incident scenarios to realistically challenge the technical assessment capabilities of the RST within the NRC response. Evaluate analogous approaches for FCF safety team technical assessment capabilities.

5.3 Federal and International Coordination

Five Federal activities and two international efforts affect the NRC's response program. Specifically, the Federal activities involve coordinating the radiological response under the federal radiological emergency response plan (FRERP), coordinating a response following a Presidential declaration under the federal response plan (FRP), coordinating response involving hazardous materials under the NCP, coordination with the FBI in the event of terrorism or illegal activity, and coordination with the DOE in establishing the program for environmental monitoring during an emergency. The international activities involve the IAEA and the Nuclear Energy Agency (NEA).

The IRD has a plan for participating in these Federal and international activities. The plan lists all of the committees and other activities, staff assigned, and the level of participation, as determined by the level of importance and budget limitations.

<u>Federal Radiological Emergency Response Plan</u>

The FRERP is used to coordinate the Federal response to radiological emergencies in the United States. As directed by Congress following the TMI accident, the FRERP was developed by FEMA and other agencies in 1980. The coordination of response preparedness related to the FRERP is performed by the Federal Radiological Preparedness Coordinating Committee (FRPCC), specifically the Federal Response, Training, and Advisory Team Subcommittees. The FRPCC and its subcommittees are the responsibility of FEMA. The Incident Response Program office has actively participated in the FRPCC and its subcommittees. The FRPCC was used to coordinate the preparations for three full FFEs in 1984, 1987, and 1992, as well as a table top in 1990. (Following extensive preparations, the 1992 FFE was canceled due to budget concerns of multiple response agencies created by earlier reaction to several large natural disasters.)

The subcommittees can be used efficiently to improve the Federal response. For example, the training subcommittee is currently revising the training provided to the States to be consistent with the assessment tools used by the NRC (e.g., RTM, RASCAL, and the FRMAC Manual). This should improve the effectiveness of a response.

FEMA is responsible for the program that ensures adequate State and local response capabilities are in place around the nuclear power plants (NPPs). This program is also coordinated by the FRPCC. The Incident Response Program office is participating in a FEMA strategic review of this program. This review has recommended several initiatives to promote a more integrated licensee, Federal, State, and local response.

<u>Federal Response Plan</u>

The FRP, first developed in 1992, describes the Federal response to all emergencies following a Presidential declaration of an emergency or disaster. FEMA developed this all-hazards plan when the Stafford Act (1988) allowed Federal disaster relief funds to apply to technological or man-made disasters (i.e., nuclear power plant incidents). The FRP is routinely used to respond to emergencies in the United States. In the spring of 1998, FEMA reported that it was simultaneously responding to more than 20 emergencies under the FRP.

The FRP forms the basis for the non-radiological support provided during the response to a radiological emergency. FRP preparedness is coordinated by a Catastrophic Disaster Response Group (CDRG) with the support of numerous committees and groups. Since Hurricane Andrew in 1992, FEMA has had an aggressive program to continually upgrade its response under the FRP. This has resulted in a continual stream of detailed operational documents requiring coordination with the NRC. The NRC participates on the committees and groups that deal with activities related to a response involving an NRC-licensed activity.

The FEMA response under the FRP is primarily performed by their regional staff. The NRC would rely on the FEMA region staff to coordinate the non-radiological functions during an emergency. During the preparations for the Salem exercise in the spring of 1998, it became clear that the FEMA regional responders are not familiar with the radiological response under FRERP. FEMA HQ did an informal survey of their regional personnel and found that most did not understand the relationship between the FEMA and LFA roles. Therefore, there is a concern that there may not be an adequately coordinated radiological (FRERP) and non-radiological (FRP) response to an emergency. As a result, NRC and FEMA are updating the FEMA/NRC procedures detailing the coordination of an FRP/FRERP response. FEMA and NRC responders will require training on these revised procedures.

<u>National Contingency Plan</u>

The NCP is the Federal plan for coordinating the Federal response to a hazardous materials release or spill. The NCP is coordinated by the national response team (NRT) chaired by EPA and is supported by regional response teams (RRT) and various committees. The NCP could apply to chemical releases from nuclear power plants and any hazardous material release from other NRC-licensed activities.

In the past, it was thought that there was little need for detailed planning for a combined Federal response under the FRERP and NCP. However, in 1997, the NRC became the LFA for the GDPs. A GDP emergency could clearly involve a chemical release and, therefore, a response under both plans. Consequently, in the fall of 1997, the NRC's Incident Response Program office and the EPA developed a draft concept of operations describing a joint NCP/FRERP response. This effort and recent materials events indicated that many emergencies involving NRC licensees may involve a response under both plans.

The Federal response under the NCP is coordinated by the EPA or USCG onscene coordinator. The OSC has the authority to direct the onscene Federal response to mitigate the hazardous material release. There are more than a hundred OSCs throughout the United States. In most cases, the OSCs are unaware of the provisions to coordinate a response under the NCP and FRERP, and therefore, require training.

<u>Federal Bureau of Investigation</u>

Since the Oklahoma City bombing in 1995, there has been a very large level of activity on planning for emergencies involving terrorism and weapons of mass destruction (WMD). This has included the development of a Terrorism Incident Annex to the FRP and various implementing procedures. FBI and FEMA briefings on the counter-terrorism program and the terrorism incident annex, identify the DOE as providing the technical assistance during a terrorism event involving NRC licensees. This is inconsistent with the FRERP and the FBI/NRC MOU. This separate planning could lead to a disorganized Federal response and could confuse licensees. State and local responders established a coordinated response program with NRC after TMI. This misunderstanding may have developed because the DOE provided more support to this effort than the NRC. The DOE has devoted full-time support to the FBI to develop the program for responding to events involving WMD.

FBI response to events is primarily directed from the FBI field offices (more than 50). The FBI field office personnel have not been trained and in most cases have not been briefed on the role of the NRC in response to an incident at an NRC-licensed facility.

Department of Energy

The DOE has the responsibility for coordinating the Federal offsite radiological environmental monitoring in the event of a release. In addition, the DOE has many of the assets used to conduct monitoring. The Federal Radiological Monitoring and Assessment Center (FRMAC) program develops the Federal radiological monitoring and assessment manual that would be utilized in the event of a radiological release. The FRMAC program is managed by the DOE and coordinated through an interagency management panel and several working groups. In 1995, with considerable NRC support, the FRMAC working groups substantially upgraded the FRMAC capabilities to include the development of a set of detailed manuals for monitoring and assessment. These manuals are continually revised and updated to address lessons learned, incorporate new Federal guidance, and reflect technological advances. Ongoing NRC involvement in the development of the FRMAC is needed to ensure that the NRC's monitoring and assessment needs are addressed during a response.

The DOE also maintains the aerial measurement system (AMS), which includes fixed wing aircraft and helicopters used to conduct aerial monitoring following a release. For many years, the NRC funded a program to use these assets to conduct routine surveys of NRC-licensed facilities. These surveys provided information on background radiation levels and enhanced the proficiency of the AMS personnel in monitoring NRC facilities. In addition, the DOE (with NRC support) developed standardized geographic information system (GIS) maps for the areas around nuclear power plants. These GIS maps were shared with the States to promote harmonization during a response. However, as a result of budget reductions, NRC support of the AMS and GIS efforts ceased in 1998.

International Activities

The IAEA and NEA have several efforts underway that directly impact the NRC's response program. IAEA is responsible for implementing the international assistance and notification conventions. Under these conventions, the NRC notifies IAEA of events involving NRC licensees with the potential for a trans-boundary release. In 1995, IAEA initiated an aggressive program to develop guidance for appropriate response to events on the basis of lessons learned from radiological emergencies worldwide. The NEA is sponsoring a series of response-related activities such as international exercises and development of protocols for exchange of information in the event of a major radiological emergency. Since about 1995, IRD participation in the response related efforts of these international organizations has been minimal, resulting in a substantial decline in lessons learned from foreign response experience and loss of awareness of international response developments.

The NRC has also signed agreements with Mexico and Canada. Under these agreements, the parties are responsible for notifying each other and sharing information in the event of a significant radiological emergency. The NRC has developed an effective working relationship with Canada, as demonstrated during the response to several actual events (most recently the alert at Davis-Besse).

Summary

The level of IRD effort for coordination of the Federal and international incident response activities has been budgeted at about 1.0 FTE for more than 10 years, and until recently, had been targeted to be increased. However, because of budget limitations, the planned increase was rescinded.

During the 1990s, there was a significant escalation in the level of Federal activity related to emergency response planning and coordination requiring NRC involvement. This escalation has resulted from new or increased Federal response programs prompted by a number of major events such as the Oklahoma City bombing and Hurricane Andrew response emergencies, as well as an increased scope of NRC responsibilities attributable to GDP oversight and Federal response program revisions (e.g., FRMAC developments). Currently, the NRC periodically attends briefings and HQ and regional coordinating meetings (e.g., regional RRT meetings) to try to stay informed and keep the response staff of other Federal agencies informed. On the basis of the current level of effort and the current level of Federal emergency response coordination activity, there is a concern that the resources and/or the approach may not be sufficient to ensure that the NRC's response program is sufficiently well coordinated with the changing Federal response system. Additionally, current radiological emergency plans were developed years ago and are now being bypassed and forgotten by those who would be called upon to support such a response. At the same time, the NRC resources may be insufficient to maintain the necessary staff participation level. In this regard, FEMA-EMI uses the emergency education network (EENET) to effectively provide nationwide training to thousands of Federal, State, and local responders nationwide.

Initiative: Develop and document standard guidance and training on the NRC coordination of a response under the various Federal plans and agreements (e.g., FRERP). Provide this training to regional Federal personnel (FEMA, FBI, EPA) who may support or interface with an NRC lead response. Evaluate the cost-effectiveness of using the nationwide EENET broadcasts to provide this training. Seek to incorporate the NRC's training into the FEMA standard radiological response training package.

Initiative: Participate in IAEA and NEA efforts that have a strong potential to significantly and directly improve the NRC's Incident Response Program or its implementation.

5.4 State Outreach

The SA team conducted an assessment of State Outreach (which is principally for the reactor incident response area) to determine whether there were opportunities for increased efficiency (e.g., cost, quality, timeliness) in State responder technical training and orientation activities. These activities account for about 0.7 FTE of the 1.0 FTE budgeted for State Outreach.

The SA team also held discussions with State representatives and responsible HQ and regional incident response staff to identify potential efficiency issues and opportunities. State representatives indicated that NRC State Outreach training and orientation were critically important, in that they provided the greatest opportunity to directly interface with NRC response personnel and to obtain information on NRC and Federal incident response roles, assets and processes. Normally, the State outreach sessions are conducted in conjunction with ingestion exercises which occur every six years. Therefore, the SA team found that the relatively high turnover rate for State responders adversely affects the ability to maintain a cadre of State responders who have experienced either NRC State Outreach activities or NRC incident response exercises. Accordingly, despite their quality and importance to State responders, NRC State Outreach (and reactor exercise) activities do not sustain the desirable level of knowledge of NRC and Federal response programs among the cadre of State responders. Additionally, the NRC's current State Outreach program concentrates on States that are involved in emergency planning for power plant accidents. Therefore, States with materials licensees that are not within the emergency planning zone (EPZ) of power reactors do not always receive training on the Federal response. Finally, some State response personnel have suggested to the Incident Response Program office staff that the NRC publish detailed guidance on the preparations that States should make to enable them to effectively interface with the Federal response. The DOE posts such training material on the DOE's Internet home page.

Initiative: Seek to be more efficient in conducting State outreach using approaches that reach all the States (i.e., including those States not within an EPZ for power reactors) and a larger number and type of (i.e., materials incident) State responders during outreach training and orientation sessions. One strategy would be to combine State Outreach training with training on the NMED. Another approach could be to conduct State Outreach training as an adjunct to annual conferences or meetings that are well-attended by State responders. Additionally, the NRC's video conferencing equipment has been used in a cost-effective manner to provide simultaneous training to the NRC's regional responders in all four regions for an introductory radiological assessment course and might be similarly used for State Outreach training and orientation. Assess posting response guidance and supporting training material for the States on the NRC's Internet home page. Also, nationwide video broadcasting with FEMA's EENET system might be used cost-effectively for State Outreach training and orientation activities.

5.5 Headquarters Operations Officers

The SA team conducted an assessment of the current functions of the HOOs to determine whether there were opportunities for increased efficiency (e.g., cost, quality, timeliness). The team conducted interviews with the acting supervisor and several of the staff members who routinely perform the HOO function. Specifically, the team posed questions as to decision-making, authority, performance measures, qualification requirements, staffing levels, estimated time performing emergency response functions, alternative approaches for event notification, and opportunities for improvements. In addition, the SA team interviewed RAs and HQ office directors to solicit comments and opportunities for improvement.

The HOO function is currently budgeted at 7.0 FTEs. Current onboard staffing is 8 FTEs, with one person working on other activities at the present time. Onboard FTE staffing has been as high as 11 in earlier years, and the reduction to 8 represents a commitment to meet current budget constraints. The critical incident response activities for which the HOOs are responsible include receiving event notifications, performing a preliminary evaluation of the health and safety aspects of these notifications, notifying the appropriate response personnel, and supporting response decision-making. The HOOs also document event notifications in support of more detailed followup analysis by the NRC staff and industry. Decisions made by the HOOs involve when and who to notify during an incident. For non-emergency event notifications, the HQ program offices and the regional office have established varying criteria on when they should be notified by the HOOs. The worksheet that the HOOs use to log event notifications lists the many regulatory reporting criteria, some of which represent actual emergencies defined by the NRC's emergency plan.

On the basis of the 1996 AEOD Annual Report, of the 1,677 recorded events reported to the NRC, 78 (<5 percent) represented actual emergencies as classified by the NRC's or licensee's emergency plan. Additionally, while on shift, the time which HOOs are *actively* involved in incident response activities or incident response readiness activities (e.g., updating call out lists) is a relatively small fraction of the total shift time. Therefore, the major portion of the time that the HOOs spend on shift involves either non-emergency notifications or waiting for emergency notifications.

Feedback received from the program or regional offices has been very positive with regard to the quality of support provided by the HOOs. However, several Agreement States have expressed their belief that HOOs do not always understand materials events that they report and that the HOOs don't understand materials events as well as reactor events. States report that HOOs often place demands on the State notifier (responder) for information called for on the HOO information checklist indicating a lack of appreciation of the event and its potential seriousness. States further indicate that such requests information can cause an inappropriate delay in the notifier actually being able to respond to the emergency site to perform their response duties. Several of the HOOs interviewed indicated that the number of materials events being reported has increased, and they are scheduling training to better understand the materials and hazards involved. The HOOs generally have significantly more knowledge and experience with the design and operations of power reactor facilities then they do with fuel cycle facilities or the materials area.

The HOC contains the necessary equipment for the HOOs to perform their tasks well. They receive notifications on multiple lines which record the communications for quality control and post-event review. Phone calls can be bridged to the many parties involved with incident response decision-making. However, during incident response plan activation, their phone notification of the necessary parties has been hampered by the lack of an operable "auto dialer" notification system. This is recognized by the Incident Response Program office and is further discussed in Section 5.7.

The current around-the-clock coverage for receiving notification appears to be very timely and reliable. However, there are alternative notification and reporting processes that might require fewer resources (FTE). For example, the NRC could use a "duty officer" (DO) concept, much like the regional offices currently use. The emergency event would be diverted to the DO at home, and the notifications of NRC decision-makers and responders would be controlled from the DO's home. However, timeliness, quality and reliability problems that would be associated with the alternatives could limit the NRC's availability to implement its emergency plan or to act as the LFA as required.

***Initiative*:** Provide sufficient technical training to ensure that HOO performance is effective in connection with materials event notifications and that their taking of notifications does not impede the timely response of State responders to the scene of an incident.

***Initiative*:** Include an incident response component and a non-incident response component in the HOO shift coverage budget. The incident response component should reflect the estimated fraction of the time that the HOOs are actively involved in incident response activities. The non-incident response component should reflect the approximate percentage of time the HOOs are not actively involved in incident response activities. Recognizing both components would establish a budget model in which to consider and evaluate the assignment of lower priority optional HOO tasks (e.g., events assessment) that would increase overall HOO utilization.

5.6 Emergency Response Coordinators

Emergency response coordinators (ERCs) in each regional office are tasked with maintaining the regional component of the Incident Response Program. In general, each ERC is aided by an emergency response assistant (ERA). Their duties include maintaining the regional IRC, maintaining an availability listing for responders, training personnel (including preparing for and participating in exercises), maintaining the RDO and pager programs, updating response plans, contact lists, and procedures, and participating in State Outreach briefings. ERCs also participate in response to actual events. The budget provides 1.25 FTEs for each region to implement the ERC and ERA functions.

There is considerable disparity in implementation of the ERC functions across the four regions. Regions II and IV have a full-time ERC. Regions I and III have part-time ERCs who perform nonresponse duties such as inspections and emergency plan change reviews. In addition, ERCs report to different management levels, depending on their placement in the regional organization. Varying reporting levels and organizations within the regions can reduce the quality, consistency, and perceived authority with which the ERCs perform their response readiness duties.

Ideally, the ERC/ERA function should be set up and conducted consistently in all regions. Depending on the option selected, this could be a full-time or part-time position. A full-time ERC would be able to spend additional time coordinating with States and local offices of Federal agencies and maintaining the program. A part-time ERC might be appropriate in regions not designated as the HOC backup if a concept of operations were selected that would reduce the regional role and responsibility for incident response.

Initiative: Standardize the ERC function. Establish a consistent supervisory reporting relationship with sufficient rank (e.g., division director) and a consistent appropriate time commitment across all regions. Make the position full-time or part-time depending on the concept of operation option selected.

5.7 Information Technology Infrastructure

Emergency Telecommunications System

The emergency telecommunications system (ETS) was established following the accident at TMI to provide for reliable communication with a licensee following a severe reactor accident. The intent was to provide for telephone lines that would not fail if the local telephone company switch was overwhelmed by local calls or otherwise affected by a nearby reactor accident. The system consists of direct access lines (DALs) linked to the FTS-2000 network. The DALs are essentially dedicated circuits to the sites that are not switched at the local telephone company's central office. The cost of maintaining the DALs is a significant budget item, at about $830,000/yr. The current contract will expire in December 1998, with costs expected to increase. AEOD had an independent contractor perform a study to determine, from a technological and economic standpoint, the most effective and appropriate way to provide communication between the HOC and the reactor sites. This study is reflected in a recent Commission paper, entitled "Upgrading the NRC Operations Center Emergency Telecommunications System," SECY-98-194, dated August 13, 1998. The commission paper recommended approval of near-term Option 1, and mid-term Option 2. This would maintain the current system in the near term, and have utility telecommunications systems replace the current system in the mid-term. The contractor study also recommended that the DALs, except for the emergency notification system (ENS), should be removed from plants in decommissioning. Discussions with the staff indicated that these lines are removed when a plant reaches the point where there is no longer a need for offsite emergency planning (7 to 12 months). Once a plant enters the decommissioning phase (cold shutdown, defueled), the probability of a severe accident is significantly removed. Once in cold shutdown and defueled, most of the ERDS data is no longer relevant.

Initiative: On a safety and risk basis, generically reexamine the need for the DALs for plants that are entering decommissioning. Determine if the DALs (except the ENS) might be disconnected sooner (e.g., 12 to 18 months sooner) than currently permitted by licensee emergency plans and implementing procedures for plants in decommissioning. The estimated cost savings are estimated to be about $10K/unit/yr for all DALs. The potential cost savings would need to be weighed against the costs to the licensee for submittal of revised site emergency plans and the cost to the NRC staff for reviewing and approving the proposed document revisions.

<u>Emergency Response Program Information Technology</u>

The HOC was designed with a high degree of reliability in terms of habitability, power supplies, telecommunications, and information display. Habitability was ensured by an independent and independently controlled heating, ventilation, and air-conditioning (HVAC) system. Power surge protection, uninterruptible power supplies, and a backup diesel generator system ensure electrical power supply. Highly reliable telecommunications are ensured by multiple lines, many of them dedicated lines, coming into the center, and a separate phone switch dedicated to HOC operation. Creating, storing, sending, and displaying information is ensured by the creation of the operations center information management system (OCIMS), which is a central system with several different subsystems. OCIMS is maintained under contract.

Each of these systems must be maintained; however reliable, a system will eventually become unreliable and fail if not adequately maintained. Each of the systems requires differing degrees of maintenance to remain reliable, and there are varying costs associated with this maintenance. For brevity, the SA team assumed that the systems providing habitability, power supplies, and telecommunications (telephone) were absolutely necessary for center operation, and their maintenance costs were therefore acceptable. Telecommunications systems are addressed in other sections of this report. The HOC itself has minimal costs associated with maintaining the overall facility in a state that is "response ready."

The SA team reviewed the OCIMS with regard to system functions, reliability, and maintenance costs, as well as how the system relates to Incident Response Program functions. OCIMS is an integrated system consisting of a voice subsystem, an ET briefing subsystem, a video display subsystem, and a data subsystem. The system was designed for high reliability, with redundancies where necessary. A vulnerability study, including a fault tree analysis and failure rate estimates, was performed by the Incident Response Program staff to identify portions of the system that have the potential to reduce the system's reliability. The system is currently undergoing modification to address the Year-2000 (Y2K) problem. Discussions with Incident Response Program office staff also indicated that the FY 2000 office budget does not have adequate funds assigned for maintenance of the OCIMS system as it is currently configured.

The voice subsystem was viewed as necessary for the HOC function, and requires little maintenance. The ET briefing subsystem provides mission critical information to the ET. The video display subsystem provides video displays of various kinds to selected large video monitors. Discussions with the program staff also indicated that the video display system monitors require periodic maintenance and calibration. The data subsystem receives several kinds of data and provides information for display or transmission to other subsystems.

The ERDS receives transmissions of licensee reactor parameters, formats the data, and provides data display. The system requires considerable periodic testing and maintenance. ERDS is relatively reliable, but does not contain safety-related or class IE equipment, and therefore may be unavailable in an emergency. Although the ERDS data is a small subset of reactor parameters, transmitted parameters are those considered as worthwhile for use in accident analysis. ERDS is required by regulation and agreements with various States; elimination of the system was not considered. Maintenance of the ERDS system is accomplished under a contract.

The data subsystem is essentially a small local area network (LAN) and requires periodic testing and maintenance to be reliable. The system includes a server that provides file and print services to the users of the RCS software located on all of the HOC workstations and an asynchronous communications server that enables the initial site team to have remote access to the information generated in the HOC. The latter capability supports potential reduction in the initial site team staffing via team access to the HOC generated information. Also portions of the system are continuously in use, supporting the HOOs.

Considerable portions of the HOO functions relate to NRC non-emergency information flow rather than incident response (reactor status, 10 CFR 50.72 reports, and allegations). One portion of OCIMS is the satellite dish system, which is most often utilized for tasks other than emergency response. Those portions of the OCIMS subsystem which are not utilized for incident response should be budgeted by the group that benefits from subsystem use.

The combined maintenance costs for OCIMS and ERDS have historically ranged from about $400K to $500K per year in the Incident Response Program office budget. Currently, one contractor supports the OCIMS by providing periodic maintenance, routine testing, upgrading and troubleshooting.

During the 1998 budget process, the Incident Response Program office staff evaluated the possibility of reducing the information technology budget by utilizing AUTOS instead of OCIMS.

Results of that review indicated that conversion to AUTOS would be costly in the near term, might not significantly reduce overall costs, would add complexity, reduce information flow, and would represent reductions in security and reliability. At the time of the SA, the staff evaluation results were in ongoing review. Nevertheless, there may be opportunities for reducing the maintenance costs of OCIMS, ERDS, and other HOC information technology systems. One approach would be to establish system performance measurements for the HOC IT systems and benchmark system performance against comparable systems in the public and private sectors. This approach is consistent with that called for by the Information Technology Management Reform Act of 1996 (Clinger-Cohen Act). For example, the maintenance costs of NRC Operations Center IT systems could be compared to the maintenance costs of similar systems at DOE and FEMA emergency operations centers and in nuclear plant EOFs. After bench marking, HOC information technology system costs would need to be kept at or below the costs of comparable systems. For example, an analysis might show that the functions of the contractor supporting ERDS could also be performed by the contractor supporting OCIMS.

Initiative: Once the software modifications to accommodate the Y2K problem have been completed, OCIMS maintenance costs might be reduced by having a single individual maintain the ERDS and OCIMS.

Initiative: Conduct a benchmark analysis of the HOC information technology systems (i.e., review best practices for comparable systems in the public and private sectors) to identify opportunities for more effectively and efficiently managing the systems (e.g., reduce the cost of maintenance).

Initiative: Consider conducting a drill without OCIMS, to determine the capability of NRC participants to perform their duties given the loss of the system.

Initiative: Those portions of the OCIMS which are not utilized for incident response (such as the satellite dish system) should be budgeted by the group that benefits from subsystem use.

<u>Reactor Safety Assessment System</u>

The reactor safety assessment system (RSAS) is an artificial intelligence application intended to aid in the diagnosis of reactor accidents. The system was designed so that data from ERDS could be input into the program. Documentation includes a draft quick reference manual, draft plant information collection procedure, draft getting started manual, and draft table of contents. A project plan dated June 1995 included a project completion cost estimate of about $51K and an estimated annual maintenance cost of $49K. Documents reviewed were all dated before July 1997. The RSAS itself runs on a Unix workstation in the HOC. Discussions with Incident Response Program staff indicated that the system was used during several exercises with mixed results, and has not recently been used. The system has not been maintained, nor is there money in the budget for system maintenance. The system takes up a small amount of space in the HOC, and is located so that it is not a distraction. Elimination of the system would have a very minor effect on response quality, timeliness, reliability, or efficiency.

Initiative: Discontinue the RSAS and remove the equipment from the HOC.

Automated Callout System

Currently, the HOC uses a manual callout tree to notify HQ responders to come to the HOC during events. This system depends on individuals to complete their assigned branches of the callout tree. If the callout tree is inadequately maintained, or an individual does not perform their branch of the callout tree, HQ responders will not be notified in a timely manner to respond to the HOC.

For a recent off-hours alert at Davis-Besse on June 24, 1998, the NRC entered standby mode for the first time since 1993. It also marked the first actual event in which HQ had the lead in standby. In responding to the event, portions of the HOC callout tree were not implemented in a timely manner. As a result, some HQ responders did not report to the HOC in a timely manner when the NRC entered the standby mode.

An automated callout system has been procured to automate the callout of HQ personnel. A similar unit, intended as a backup, is presently in Region IV. These units are designed to provide automated callout messages over 18 lines, rapidly and reliably notifying NRC response personnel to report to the HOC. The units require programming of messages, telephone numbers, and positions as well as testing, use during drills, and some maintenance. The automated call out system has not been made operational because of the lack of available resources.

Initiative: The automated callout systems within the NRC should be made operational and placed into service as soon as possible. Resources should be provided to provide for their continued maintenance. The setup and maintenance costs are consistent with expected contribution to the reliability, timeliness, and quality of NRC response function, especially during off hours.

5.8 Incident Response Facilities

Regional Incident Response Centers

The SA team conducted an effectiveness review of the regional incident response centers. This review involved assessing the need for the four regional IRC, or whether 3 of 4 IRCs should be, or could be eliminated, with one of the IRCs remaining as a backup to the HOC should the HOC not be available for any reason. The review reconsidered a cost-benefit study conducted by the Incident Response Program office in early 1997 for the same purpose. The study assessed the merits of a Budget Review Group (BRG) recommendation to eliminate three of the four regional IRCs. The assessment was predicated on the current concept of operations in which the region has the lead for the NRC's response in normal mode (and monitoring phase of normal mode), supports HQ in standby mode and initial activation mode, and is responsible for dispatching the initial site team. The 1997 cost-benefit analysis concluded that there would be little cost savings to the NRC if three of the four regional IRCs were eliminated. This conclusion was founded in large part on the finding that the cost of maintaining the regional IRCs was minimal, while there would be some cost to convert the IRC space to other purposes. Additionally, the RAs made a strong and convincing case that the IRCs provided critical infrastructure support in meeting the regional responsibilities for the current concept of operations within the emergency response mission.

The reexamination of the study by the SA team resulted in the finding that there had been no substantive changes to the basis for the costs and benefits identified in the study given the current concept of operations. For the alternative concepts of operations which involve regional lead in standby and initial activation (Options 4 and 5), the regional IRCs would be essential. In fact, in all likelihood, the IRCs would need to be *expanded* to accommodate the increased number of regional responders associated with these options. However, for the alternative concepts of operations involving (minimum teams) with HQ in the lead, and either a HQ initial site team (Option 3), or an intra-NRC initial site team (Option 6), the basis for the prior conclusion of the need for the regional IRCs could be significantly reduced. The need for the regional IRCs would be further reduced if HQ had the lead in normal mode (and monitoring phase of normal mode) in connection with Options 3 and 6.

Initiative: Retain the four regional IRCs if the current concept of operations is retained. If a decision is made to reduce the regional role for incident response, the need for the regional IRCs would be diminished and the 1997 IRC cost-benefit analysis should be reanalyzed.

<u>Site Emergency Plans and Emergency Plan Implementing Procedures</u>

Currently, emergency plans and emergency plan implementing procedures (EPIPs) for all sites are maintained in the HOC. Identical documents are maintained at the regions for their assigned sites and at the RI's office at each site. Licensees are required to provide copies of changes to the emergency plans and EPIPs to the NRC within 30 days of a change. Maintaining duplicate copies of the emergency plans and EPIPs serves the function of providing documents should either the regional office or the HOC become unusable. However, copies of the documents are also available on the nuclear documents system (NUDOCS) in HQ and each regional office, although searching for, retrieving, and printing the documents needed would be time consuming. The NRC's agency-wide document management system (ADAMS) document management and retrieval system will replace NUDOCS and is scheduled to be operational in the NRC over the next year or two.

Review of a small selection of emergency plans and EPIPs maintained in the HOC indicated that the documents had been well maintained. Discussion with response individuals indicated that the emergency plans and EPIPs were not extensively utilized during exercises, with the exception of the emergency action level matrices and procedures or flowcharts related to PARs. The large majority of the emergency plans and EPIPs are not used by the NRC in any fashion. While the FTE resources to maintain the documents in the HOC are relatively low, this expenditure is a duplication of efforts and of minimal value.

Initiative: Maintain site emergency plans and EPIPs only at the regional and RI offices, and the regions specifically tasked with assessing licensee adherence to their plans and procedures. Evaluate whether the emergency plans and EPIPs could be maintained and accessed in a timely and reliable manner via the ADAMS when it becomes operational.

<u>Plant Information Books and Electronic Plant Information Books</u>

Plant information books (PIBs) contain overview material for each power reactor site. Specifically, Volume 1 includes facility statistics, emergency response information, plant description summary, simplified plant system diagrams, and detailed plant system data.

Volume 2 contains utility management and organization information, financial statistics, information concerning systematic assessment of licensee performance (SALP) indicators, and travel maps. Electronic plant information books (EPIBs) are electronic versions of Volume 1 of the PIBs, which have been placed on the NRC's public access page on the Internet. The PIBs were established in the early 1990s, in response to a suggestion from the Chairman. Data in the books was compiled by the NRC staff and University of Maryland students, largely from other documents submitted by licensees such as the final safety analysis report (FSAR) and emergency plan. Some of the line diagrams in the information books are overly simplified or of unverified accuracy. Although a maintenance agreement to update the EPIBs was established, resource limitations have resulted in much of this information becoming outdated. Many licensees have modified their facilities in the interim, and the EPIBs had been updated in some areas. Also, many licensees have updated their FSARs to become the updated FSAR. Almost all of the information in Volume 2 of the PIBs is also significantly out of date, with the exception of the travel maps. Response reliability and response timeliness issues arise in using out-of-date documents or drawings during an incident response. There is the potential to divert responder time and attention from incident response activities to determine if and where changes may have been made to reference documents. Incorrect drawings could result in erroneous assessment and incorrect communications to outside organizations. System diagrams are available in updated final safety analysis reports (UFSARs) or vendor literature. Cognizant Incident Response Program office staff indicated divergent views of the usefulness of the PIBs. Some indicated PIBs were highly useful and used during exercises; others indicated that they were not used and not usable.

Initiative: The PIBs and EPIBs should be eliminated, and the travel maps retained. The staff should rely on the FSARs (and UFSARs) for the plant information needed during a response. Although little or no savings would result (since minimal effort is required to maintain them), response reliability and quality could be enhanced.

5.9 Other Readiness Issues (Responder Recognition)

The Incident Response Program office staff reported a continuing difficulty in arranging for responders to participate in exercises. This difficulty appears to be symptomatic of several factors, including a lack of budgeting for staff participation in exercises (and training), heavy workloads of responders (responders are among the most capable in the NRC and are therefore the most heavily sought after and relied upon in their regular positions), and a weak system for routinely recognizing responders for their contributions to ensuring response readiness in support of the NRC's health and safety mission. Nevertheless, for the recent alert at Davis-Besse, when the NRC entered the standby mode of operation during off hours, responders readily reported to and maintained a constant presence at the IRC, HOC, and the site for an extended period. This was the first NRC response to an alert that had occurred in the last several years. Following the response, NRC senior management formally commended the responders for their dedication, professionalism and high level of performance. However, the team found no systematic approach to visibly recognize responders for their commitment to ensuring response readiness.

***Initiative*:** To promote awareness and recognition for the importance of response readiness, consider initiating a mechanism to more routinely and more visibly recognize responders for their qualification as responders and for their commitment and participation in response readiness activities.

6.0 RECOMMENDED AND SUGGESTED INITIATIVES

This section compiles all of the initiatives which are documented in Sections 3, 4 and 5. Each initiative has been catalogued as either a “recommended initiative” or a “suggested initiative.” Recommended initiatives (presented first) are those initiatives that are viewed as having the greatest potential for either significant cost savings or significant performance improvement (i.e., quality, timeliness, or reliability) in response functions or readiness activities. For recommended initiatives that potentially involve significant cost savings, the potential estimated savings in FTE and/or dollars are provided where it could be quantified. Recommended initiatives that involve potentially significant cost savings that could not be estimated are noted as such. Quantitative estimates are conservatively calculated on the basis of 2080 hrs in an FTE. Where estimated potential savings are noted, the latest NRC budget should be reviewed to determine whether implementation of the specific initiative has already been credited in the most recent NRC budget. Initiatives that are principally contingent on improvements in quality, timeliness, or reliability do not have an associated cost saving statement. For these initiatives, the associated quality, timeliness, or reliability aspects are discussed in the respective report section(s) providing the bases for the initiative. Suggested initiatives are those that are viewed as having potential for some cost savings or performance improvement in response functions or readiness activities. Initiatives presented in this section are derived on the basis of the initiatives identified in the previous sections. Where initiatives in previous sections were found to be similar or involve a facet of a broader initiative area, they were combined and melded into a single unified initiative. In this way, fewer but more comprehensive initiatives have been presented where possible. Additionally, initiatives have been identified as “short-term” or “long-term” depending on the amount of resources and time required to implement the initiative.

The individual initiatives below should not be viewed in isolation. (There is an interdependency in some cases.) Those that involve response process changes assume that the associated responder procedures and training will be developed and effectively implemented so as to ensure quality performance in connection with the new process. Additionally, the front-end resource costs needed to fully evaluate, develop, and document the revised work processes, etc. associated with the SA team identified initiatives and the resources needed to develop and provide training in the revised work processes have not been quantified by the team. These developmental costs could be considerable and have not been budgeted. Therefore, an integrated assessment of the initiatives is necessary if a transition to a new concept or process is to be successful.

6.1 Recommended Initiatives

Goals and Objectives

Establish, document in formal guidance, and communicate in NRC responder training, a clear definition of “incident response” so that the staff can recognize and understand the difference between incident response activities and followup (e.g., investigation, evaluation) activities. The definition for incident response should be on the basis of the goals and objectives for the incident response function. (Short-term)

NRC management controls and practices should ensure that non-incident response activities (such as investigation and evaluation) do not impede, distract, or compete with the primacy of incident response goals, objectives, and activities during the response to incidents. The potential cost savings associated with this initiative could not be determined. (Short-term)

Budget

Following development of an NRC-wide Incident Response Program plan, the regional offices and those HQ offices that provide significant professional, technical, or administrative resources for incident response activities (i.e., incident response training, exercises, response to actual incidents), should have resources (FTE) explicitly allocated, at the appropriate levels, to support response activities. Budgeting the resources for readiness activities would eliminate conflicting messages regarding top management priority support for the Incident Response Program. (Short-term)

Include an incident response component and a non-incident response component in the HOO shift coverage budget. The incident response component should reflect the estimated fraction of the time that HOOs are actively involved in incident response activities. The non-incident response component should reflect the approximate percentage of time the HOOs are not actively involved in incident response activities. Recognizing both components would establish a budget model in which to consider and evaluate the assignment of lower priority optional HOO tasks (e.g., events assessment) that would increase overall HOO utilization. (Short-term)

Event Notification and Reporting

Revise GDP, material licensee, and certificate holder event notification, reporting and emergency classification requirements on the basis of risk and safety significance. GDP events involving low safety significance should be submitted as 30-day written reports. The potential cost savings of not receiving and processing notifications for low significance FCF and materials licensee events could not be estimated. (Long-term)

Continue efforts to expeditiously refer to the EPA event reports of nuclear materials not licensed by the NRC or an Agreement State in accordance with the FRERP. (Short-term)

Response Decision-Making

To assist the HOOs in assessing whether NMSS response decision-makers should be notified, develop and document response guidance (e.g., threshold criteria) for materials incidents and ensure that existing response guidance is risk-informed for FCF incidents. (Enhanced risk-informed procedural guidance would promote the expenditure of NRC response resources on risk significant events, simplify response decision-making and activation process, and provide for a more timely response.) The potential cost savings could not be determined by the team. (Short-term)

For reported materials events, responders should seek to determine as soon as possible if an actual, potential, or perceived radiological health and/or safety risk is involved (for which an NRC incident response is required), or whether the radiological health and/or safety risk have been terminated such that an NRC followup response (e.g., incident investigation or incident investigation monitoring) may be indicated. (Short-term)

Streamline the response decision-making and activation processes for reactor, FCF and materials incidents to make them more timely and somewhat more resource efficient. (Long-term)

Finalize and implement a call list of materials technical specialists and experts for consultation on the health and safety significance of materials events. Ensure that the call list is contained in the EO briefcase, and distributed to the EOs and HOOs. Limit *active* participation in incident response to those who needed to initially respond to the event. Clarify procedures to allow others interested in the event to participate in conference calls, but only as "observers." (Short-term)

Clearly define the expected response role of the NRC staff for materials incidents which occur in Agreement States. The expected response role should be formally documented in connection with final decisions on the materials response initiatives. (Short-term)

<u>Concept of Operations</u>

For power reactors, fuel cycle facilities and materials incident response, implement a trial program to assess the acceptability of minimum teams (minimum staffing for HQ "virtual monitoring" for materials incident response) within the current concept of operations (Option 2). On the basis of the results of the trial program, establish the minimum team approach on a permanent basis, as appropriate. The NRC-wide potential cost savings is estimated to be a total of about 1.7 FTEs for reactors and 0.2 FTEs for FCFs (1.9 FTEs for both combined). (Short-term)

For power reactor response, *if the increased initial site team response time is acceptable,* develop and implement an evaluation program to fully assess quality of performance, reliability, timeliness, etc. of alternative response concepts such as HQ staff participation on the initial site team and minimum teams (e.g., Options 3 and 6). The evaluation should carefully assess all potentially significant performance and reliability issues identified by the SA team and panel of experts. On the basis of the results of the evaluation, establish the alternative response concept and minimum team approach on a permanent basis, as appropriate. For Option 6 (i.e., intra-NRC initial site team), the NRC-wide potential cost savings is estimated to be as much as an additional 1.5 FTEs (above the savings for minimum teams within the current concept of operations), or a total of about 3.2 FTEs for reactors. (Long-term)

For fuel cycle facility response, reevaluate the FCF initial site team concept and composition. Develop guidance for dispatching an FCF initial site team including its function and composition. Conduct an in depth evaluation and trial program to fully assess the quality of performance, reliability, etc. of alternative initial site team options, especially the intra-NRC initial site team. For Option 6 (i.e., intra-NRC initial site team), the NRC-wide potential *incremental* cost savings is estimated to be as much as an additional 0.1 FTEs (above the savings for minimum teams within the current concept of operations), or a total of about 0.3 FTEs for fuel cycle facilities. (Long-term)

Establish a new, separate concept of operations framework and response process that is tailored to the special needs of materials incident response. Formally document the process and establish implementing procedures. (Long-term)

Organize and composing the ET to include NRC senior managers having specialized knowledge and experience across all of the LFA responsibility areas, including Congressional affairs, Federal coordination, public information and State support. (Short-term)

<u>Other Response Initiatives</u>

Except for the most severe hurricanes (e.g., Category 4 or 5), discontinue tropical storm and hurricane monitoring (i.e., continuous incident response center staffing) after verifying that all onsite emergency AC power systems are fully operable at the potentially affected facilities. Hurricane paths should be *tracked* solely to ensure that satellite communications are pre-positioned and the resident inspectors are relieved, as needed, at the potentially affected facilities. The NRC-wide resource savings will vary with the number of hurricanes each year, but is estimated at about 0.4 FTE. (Short-term)

Ensure reliance on States for response to transportation accidents in accordance with established NRC policy, “NRC Response to Accidents Occurring During the Transportation of Radioactive Material” (49 FR 12335). Provide and discuss with the regional offices, a copy of the NRC/DOT MOU and policy statement during an upcoming regional ERC workshop and/or regional training courses. (Short-term)

The HQ incident response staff should work with the OCIO to identify approaches to allow for a reasonable time delay (e.g., a minimum of 24 hours) in posting on the Internet 24-hour material event reports. State regulators should also be reminded that current OSP guidance allows States up to 24 hours of notification by their licensee to notify the NRC’s HOC of the occurrence of a “significant” materials event. (Short-term)

<u>Program Development and Response Coordination</u>

Ensure clarity and consistency in the NRC’s organizational and program documents with respect to office roles and responsibilities for Incident Response Program development. Re-establish a nuclear materials and FCF incident response coordinator in AEOD (i.e., the Incident Response Program office). Emphasize improving coordination and effectiveness of incident response activities between NMSS and the Incident Response Program office. All documents that are developed outside of the Incident Response Program office and which provide formal policy or procedural guidance on the incident response function should be coordinated with and concurred upon by the Incident Response Program office. . (Short-term)

Revise NUREG-0728 and the supporting concept of operation to (1) address response to the full spectrum of incidents for which the NRC may be the LFA (e.g., nuclear materials, transportation, research reactor, and spent fuel), (2) address any changes to the power reactor concept of operations contingent with decisions regarding initiatives in this SA, and (3) incorporate recent revisions in other Federal plans and agreements. New response concepts and modes that are tailored to materials incidents and emergencies should be included. It is expected that long-term FTE savings would result from a reduction in unwarranted responses and more efficient responses. The cost savings could not be estimated. (Long-term)

Develop and maintain an integrated NRC-wide plan for the NRC’s Incident Response Program. Annual office-level operating plans should document planned development and maintenance activities, accomplishments and resources in support of, and consistent with, the NRC's Incident Response Program Plan and MD 8.2. An FTE saving would be expected as a result of avoiding duplication of efforts and increasing resource utilization, although the amount could not be estimated. (Long-term)

Develop implementing procedures and organizational charts for the response to materials, transportation, research reactor, and spent fuel storage events. Ensure that changes to implementing procedures are validated, verified, and fully integrated among the regions, teams, and response coordinators before their implementation. An FTE saving would be expected because of the reduced number of unnecessary responses and more efficient utilization of resources during a response, although the amount cannot be estimated. (Long-term)

NRC Responder Training and Exercises

Upgrade the response training program by (1) establishing an NRC-wide policy that attendance at required annual responder training is mandatory; (2) scheduling training courses for all NRC responders; (3) conducting the fewest number of scheduled classes; and (4) conducting training to address immediate needs, including FCF and nuclear material training for the HOOs and training on basic response concepts (reactor, FCF, and material emergencies) for all response managers, including the executive team. (Short-term)

Conduct an analysis to provide a firm basis for establishing NRC response training requirements for NRC response functions and activities. The assessment should employ recognized methods to determine the type and frequency of response courses and exercises needed to maintain adequate responder proficiency. This should include a determination if any NRC response personnel are required to take the hazardous material response (HAZWOPER) training specified by OSHA requirements. The TTD should provide technical assistance for the analysis of training requirements. (Long-term)

Establish and implement a formal NRC responder training program on the basis of the analyzed training needs. This program should include (1) identifying the training and qualifications required to perform each response position, (2) developing and implementing a training program and formally documented training materials to meet the identified training needs, (3)evaluating the trainee and the training process to ensure that the training is effective, (4) incorporating lessons learned, and (5) periodically reviewing the training to verify that NRC response personnel meet established training requirements. This program should be developed with the aid of TTD. (Long-term)

Develop a multi-year NRC exercise program. The program should periodically test all aspects of NRC response program proficiency. All exercises should provide a high fidelity in simulating all major LFA responsibilities including communications with Congress, the White House, the public (media), the States, and the heads of other Federal agencies. Exercises should periodically be conducted for all types of emergencies that have the potential for serious health, safety, and safeguards consequences. Specifically, these exercises should include material events, FCF events, full Federal response under the FRERP and FRP, and events requiring interfaces with other agencies. Increase the use of drills, table tops, or other methods to provide team and integrated training. Use full-scale exercises primarily to test the integrated NRC response system and to train the highest levels of response management. Have exercises evaluated independently (i.e., by an outside organization). A significant FTE saving would be expected by reducing exercise participation, although the amount cannot be estimated. (Long-term)

Evaluate the increased use of the TTD simulators, nuclear power plant analyzers, and other methods to produce technically accurate incident scenarios to realistically challenge the RST technical assessment capabilities within the NRC response. Evaluate analogous approaches for FCF safety team technical assessment capabilities. (Long-term)

Base the periodicity of full participation exercises on maintaining NRC responder proficiency, rather than on maintaining State responder knowledge of NRC response functions and activities. Significant FTE savings would be expected by reducing exercise participation, although the amount of savings cannot be estimated. (Long-term)

Federal Coordination

Develop and document standard guidance and training with regard to the NRC's coordination of a response under the various Federal plans and agreements (e.g., FRERP). Provide this training to regional Federal personnel (FEMA, FBI, EPA) who may support or interface with an NRC lead response. Evaluate the cost-effectiveness of using the nationwide EENET broadcasts to provide this training. Seek to incorporate the NRC's training into the FEMA standard radiological response training package. Potential estimated cost savings to the NRC could not be determined. (Long-term)

Revise NRC response procedures to ensure that a suitable facility is identified and established if needed, separate from the EOF, if and when the EOF is found to be inadequate to accommodate and co-locate Federal responders with licensee responders and State and local officials. (Long-term)

State Outreach

Seek to be more efficient in conducting State outreach using approaches that reach all the States (i.e., including those States not within an EPZ for power reactors) and a larger number and type of (i.e., materials incident) State responders during outreach training and orientation sessions. Strategies could include combining State Outreach training with NMED training, training at annual conferences or meetings that are well-attended by State response personnel, using video conferencing and nationwide video broadcasts using FEMA's EENET broadcasts and, posting response guidance and supporting training material for State response personnel on the NRC's Internet home page. (Long-term)

Regional Emergency Response Coordinators

Standardize the ERC function. Establish a consistent supervisory reporting relationship with sufficient rank (e.g., division director) and a consistent appropriate time commitment across the regions. Make the position full-time or part-time, depending on the selected concept of operation option. The regional ERC resource requirements might be reduced and FTE resources saved if a concept of operations involving a reduced regional role and responsibility were shown to be acceptable and implemented. (Long-term)

Headquarters Operations Center Information Technology Infrastructure Maintenance

Conduct a benchmark analysis of the HOC information technology systems (i.e., review best practices for comparable systems in the public and private sectors) to identify opportunities for more effectively and efficiently managing the systems (e.g., reduce the cost of maintenance). Potential cost savings could not be determined, overall annualized costs might be significantly lower than the annual cost of OCIMS maintenance. (Long-term)

Response Facilities and Equipment

Maintain emergency plans and EPIPs only at the regional and RI offices, with the regions specifically tasked with assessing licensee adherence to their plans and procedures. If needed at HQ, utilize a facsimile to obtain a site-specific copy from the licensee or regional RI offices. Alternatively, the generic NUREG-0654 or NUMARC EALs may be used (with caution) to assess licensee classification decisions. Evaluate whether emergency plans and EPIPs could be maintained and accessed in a timely and reliable manner via ADAMS when it becomes operational. Potential cost savings are estimated to be less than 0.1 FTE. (Short-term)

Eliminate HQ maintenance of site-specific ERPs. If needed at HQ, utilize a fax to obtain a site-specific copy from the region. Alternatively, the generic emergency action levels (EALs) may be used (with caution) to assess licensee classification decisions. (Short-term)

The PIBs and EPIBs should be eliminated, and the travel maps retained. The staff should rely on the FSARs (and UFSARs) for the plant information needed during a response. Although little or no savings would result (since minimal effort is required to maintain them), response reliability and quality could be enhanced. (Short-term)

Discontinue the RSAS and remove the equipment from the HOC. (Short-term)

The automated callout systems within the NRC should be made operational and placed into service. Resources should be provided to ensure continued data entry into the system. The enhanced reliability, timeliness, and quality of the NRC response function, especially during off hours, should justify the setup and data entry costs. (Short-term)

The four regional IRCs should be retained if the current concept of operations is retained. The 1997 IRC cost-benefit analysis should be reanalyzed if the decision is made to reduce the regional role for incident response, since the need for the regional IRCs could be diminished. (Long-term)

6.2 Suggested Initiatives

Goals and Objectives

Establish measurable outcomes for the Incident Response Program. Alternatively (or as a first step), establish qualitative goals and objectives for the Incident Response Program.

Budget

Portions of the OCIMS which are not used for incident response (such as the satellite dish system) should be budgeted by the group that benefits from subsystem use.

Program Development and Response Coordination

As part of an overall Incident Response Program plan, include a provision to periodically review and update the NRC's response assessment tools and guidance, as well as support for development of inter-agency response procedures.

Federal and International Coordination

Ensure that the significant incident response lessons from major national and international events are incorporated into the NRC's Incident Response Program. This might be accomplished by requesting IAEA to provide a fellow to work at NRC for 3 to 6 months.

Participate in IAEA and NEA efforts that have a strong potential to significantly and directly improve the Incident Response Program or its implementation.

NRC Responder Training and Exercises

Both HOOs and FCF responders should participate in an FCF tour or observe an FCF inspection.

Ensure that first responders are trained for the task requirements of NUREG-0845 and remain qualified for their first responder duties.

Notify responders of scheduled response training courses well in advance via the NRC's e-mail system.

Conduct a drill without OCIMS, to determine the capability of NRC participants to perform their duties given a loss of the system.

Headquarters Operations Center Information Technology Infrastructure Maintenance

On a safety- and risk-related basis, generically reexamine the need for the DALs for plants that are entering decommissioning. Determine if the DALs (except the ENS) might be disconnected sooner (e.g., 12 to 18 months) than currently permitted by licensee emergency plans and implementing procedures for plants in decommissioning. The estimated cost savings are estimated to be about $10K/unit/yr for all DALs. If acceptable, the potential cost savings would need to be weighed against the costs to the licensee for submittal of revised emergency plans and the cost to the NRC staff for reviewing and approving the proposed document revisions.

Once the software modifications to accommodate the Y2K problem have been completed, OCIMS maintenance costs might be reduced by having a single individual maintain the ERDS and OCIMS.

Other Readiness Initiatives

To promote awareness and recognition of the importance of response readiness, consider initiating a mechanism which more routinely and more visibly recognizes responders for their qualification as responders and for their commitment and participation in response readiness activities.

APPENDIX A

AREAS OF SPECIAL INTEREST IDENTIFIED BY THE CHAIRMAN

In requesting that a broad-based SA of the incident response function be performed, the Chairman requested that a number of specific items be included. The items and the results of the reviews are documented below. The review and resolution of the items were performed by the IRD staff and have been included in this appendix.

Item 1

Ensure that the Incident Response Program conforms with the provisions of NRC Reorganization Plan of 1980 ("Reorganization Plan")

Response 1

An assessment was conducted to verify that all provisions of Section 3 of the Reorganization Plan are reflected in the Incident Response Plan ("IRP," NUREG-0728) or its implementing procedures, and that nothing in those or related documents conflicts with the Reorganization Plan. That assessment was reviewed by OGC, which agreed that there are no omissions or inconsistencies. OGC considers the matter closed.

Item 2

Developing and formatting emergency information for the Director of the Executive Team (ET Director), who would be the Chairman or, if so designated by the Chairman, another Commissioner

Response 2

This issue concerns the need for each technical team to provide to the Executive Team (ET) up-to-date information that is complete yet prioritized and quickly understandable. There are two technical teams, the Protective Measures Team (PMT) and the Reactor Safety Team (RST).

The PMT distills the overall status of any releases, protective actions, and PMT concerns into a single screen of text that is updated quickly each time the status changes. Once there is a significant release, or a protective action such as evacuation or sheltering has been decided by State or local authorities, the team provides additional detailed backup displays that include an electronic map of the affected sub-areas of the 10-mile EPZ and a graphic dose projection output of the RASCAL code. The PMT maps and RASCAL graphics are in color for clarity. These three displays will be used in future exercises with further improvements based on exercise critiques.

IRD progressively improved the RST status display until the ET noted, after the exercise with Prairie Island in July, 1998, that it is probably as good as it can get for ET needs.

Item 3

Tools for the ET Director to support communication with stakeholders

Response 3

The ET Director (in the ET room of the Headquarters Operations Center) must be able to provide a concise summary of critical information on request by the President, Governors, heads of other Federal agencies, and other key officials. The information must be complete, current, and easy to use while talking on the telephone. IRD subdivided the critical information into a set of specific questions and provided for them to be addressed continually by the ET members, who are advisors and assistants to the ET Director. The questions evolved through exercises into a worksheet that ET members are expected to keep current for ready use at any time by the ET director. The best procedure for keeping the worksheets current is still being developed in exercises.

Item 4

ET Director turnover during an emergency

Response 4

Leadership roles must always be very clear in an emergency. IRD reviewed the emergency procedures to ensure that there will be clear leadership and smooth transitions in both planned and contingent situations; the review found no gaps or conflicts. After notification of an emergency the Headquarters Operations Officer always contacts the Chairman via the Executive Assistant. The Chairman may at that time choose to lead NRC response activities (as ET Director) or to delegate full authority to another Commissioner. (Having delegated full authority, the Chairman can choose at any time to exercise it again.) The Executive Director for Operations (EDO) or a qualified Acting EDO will, as Acting ET Director, exercise emergency *operational* authority under a standing delegation from the Chairman during any periods when the ET Director is inaccessible. When specified *operational* authority is delegated by the ET Director to an NRC Director of Site Operations near the site of the emergency, the ET Director remains the senior NRC authority responsible for all Agency actions, in accordance with provisions of the Reorganization Plan.

The other members of the ET are advisors to the ET Director and are responsible for maintaining continuity of information through any transitions.

Item 5

Transportation and logistical support for the ET Director and others

Response 5

The ET Director may choose to lead (or direct someone else to lead) a small group to the site as part of the NRC response to a real event, but the procedures for making this happen were not clear. When a Presidential Disaster declaration is made, FEMA has the authority to task FAA to provide air transportation to principal Federal responders. That would include the ET Director and senior management because the NRC would be Lead Federal Agency in charge of the Federal radiological response to emergencies at NRC-licensed facilities. IRD is preparing specific procedures for review by FAA. For emergencies that do not result in a Presidential declaration, the staff is working with the NRC Division of Contracts to enter into an MOU with FAA to ensure that air transportation would be available on short notice for the Chairman and other senior NRC officials. The procedures and MOU are expected to be concluded in January, 1999.

<u>Item 6</u>

Realism of drill scenarios from the ET Director's perspective

<u>Response 6</u>

The staff is working to introduce scenario injects that would simulate realistic interactions with the Congress, the White House, and the media to better prepare the ET for such demanding situations. These scenario injects have been used routinely to different degrees. The staff plans to increase the emphasis on external communications in future exercises.

<u>Item 7</u>

Protocol for observers (number, location, escorts)

<u>Response 7</u>

Plans for foreign visitors/observers at emergency response exercises need to be carefully organized to avoid overcrowding, ensure adequate escort, and alert the Commission. In June the staff completed development of AEOD Procedure 22 to meet this need. It identifies the roles and responsibilities of IP, AEOD, and the regional offices in inviting and ensuring appropriate accommodation of foreign nationals wishing to observe emergency response exercises at Headquarters and in the regions.

<u>Item 8</u>

Inter-team and intra-team communications

<u>Response 8</u>

IRD response coordinators continually challenge themselves to improve the sharing of information among specialists on the same response team and to improve the flow of information between teams. The objective is to keep the NRC response unified and efficient using procedures that are as independent as possible of the personalities of team members. For example, one effect of smaller teams, which will be tested in the next exercise, should be to improve intra-team communications and coordinators will be looking for this effect. For another recent example, the physical location of one key inter-team liaison person has also been changed for the next exercise to see if poor results in the past were the result of location, procedures, or personalities.